DESCRIPTION OF CURRENT CONDITIONS
TINKER AIR FORCE BASE
OKLAHOMA CITY, OKLAHOMA

December 1992

PREFACE

Tinker Air Force Base's Resource, Conservation and Recovery Act (RCRA) Permit requires that Tinker conduct a RCRA Facility Investigation (RFI). The purpose of the RCRA RFI is to determine the nature and extent of releases of hazardous waste or hazardous constituents from solid waste management units. Section VI, Scope of Work for a RCRA Part B Permit, states the tasks that are required to be completed. The tasks are as follows: Task I - Description of Current Conditions; Task II - RFI Workplan; Task III - Facility Investigation; Task IV - Investigative Analysis; and Task V - Reports. Task I requirements are contained herein.

The Description of Current Conditions consists of the following parts bound together in this document:

A. Facility Background

B. Nature and Extent of Contamination

C. Special Permit Conditions

PART A

FACILITY BACKGROUND

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1.0 INTRODUCTION

This Facility Background is being submitted to the Environmental Protection Agency and the Oklahoma Department of Health as required by Part A of Task 1 of the Hazardous and Solid Waste Amendments (HSWA) Section of the RCRA Part B Operating Permit that was issued to Tinker AFB on July 1, 1991. The report summarizes the regional location, pertinent boundary features, general facility physiography, hydrogeology, and historical use of the facility for the treatment, storage or disposal of solid and hazardous waste. Considerable searching of files and existing documents was done to gather information on the history of the base and how wastes were managed in the past. At the same time reviews of newly published documents and checks with presently established organizations were performed to ensure that information presented herein is current.

2.0 LOCATION

Tinker AFB is located in central Oklahoma, within the corporate limits of Oklahoma City but about 6 miles SE of the downtown business area and adjacent to the suburbs of Midwest City and Del City. See Figure 1: General Location. Tinker AFB is bordered by Interstate 40 to the north, Douglas Boulevard to the east, Sooner Road to the west, and industrial and undeveloped land near SE 59th Street to the south. The general features of Tinker AFB are illustrated in Figure 2: General Features of Tinker AFB.

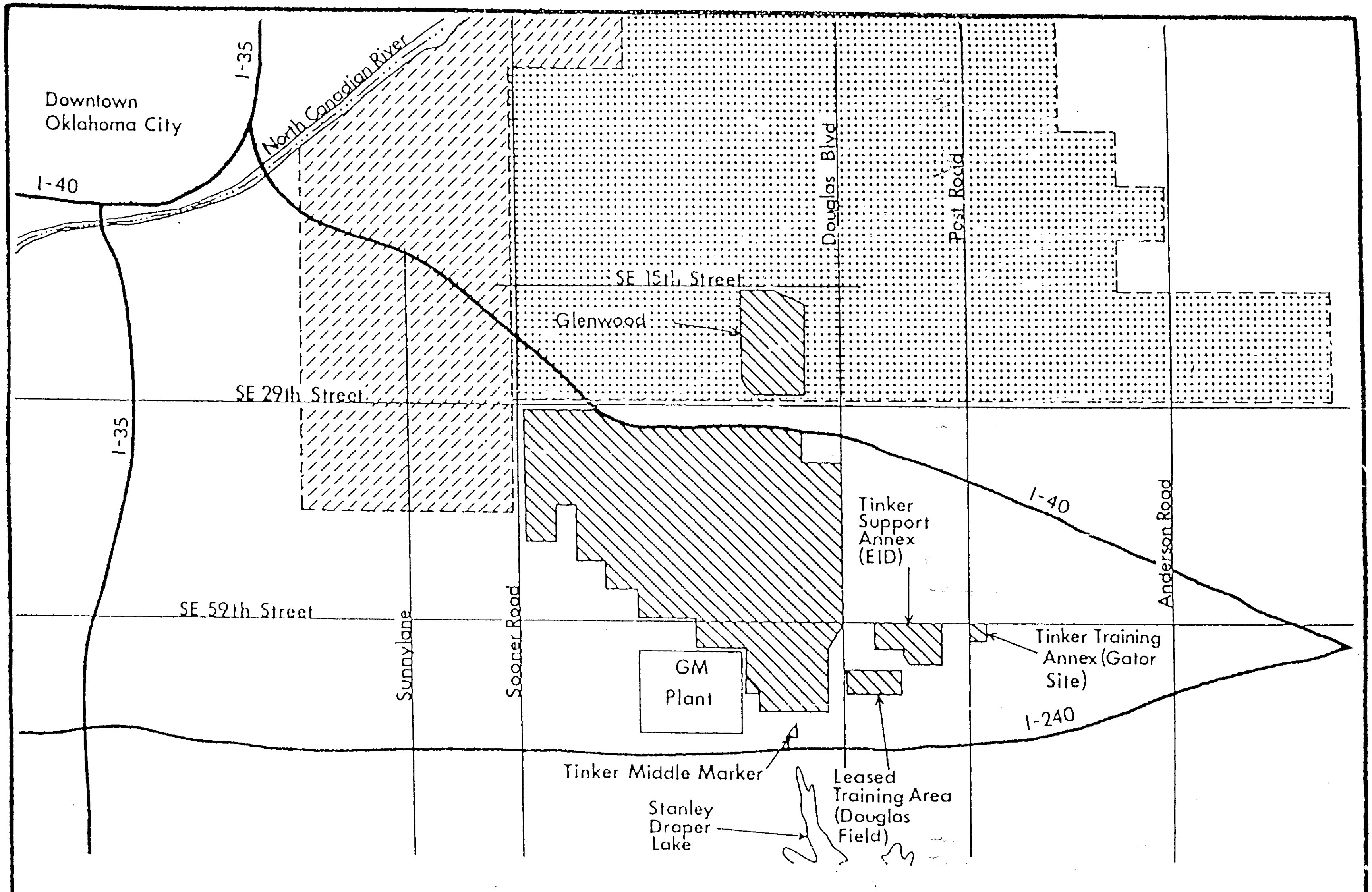


Figure 1: GENERAL LOCATION (TINKER AFB)
(NO SCALE)

Tinker AFB   Oklahoma City   Del City   Midwest City

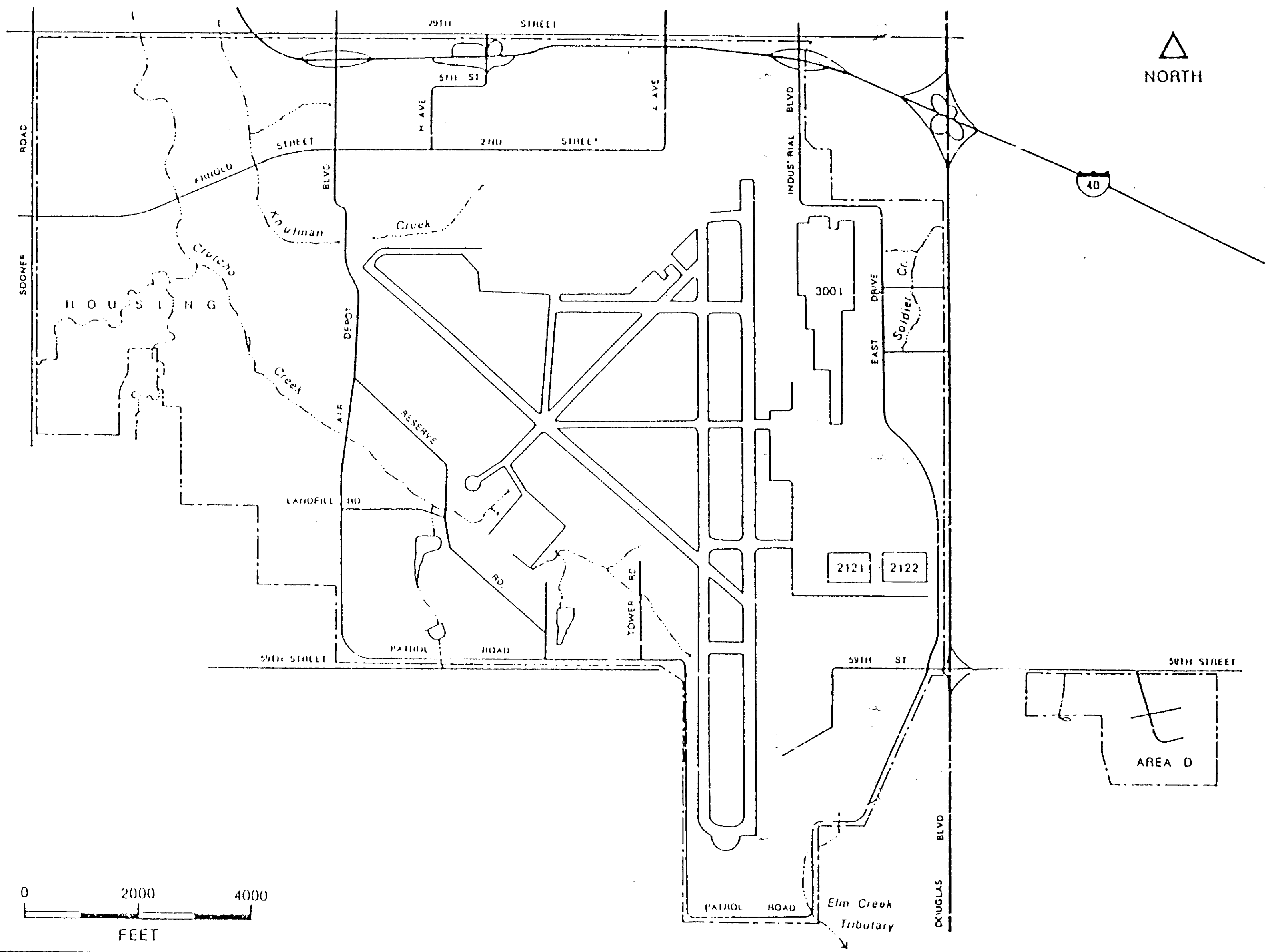


Figure 2. General Features of Tinker AFB.

3.0 INSTALLATION HISTORY

The site of Tinker Air Force Base was selected by the Site Board of the Army Air Force in March 1941. Two months later approval was granted to build a maintenance and supply depot southeast of Oklahoma City on a 960 acre site donated by the City of Oklahoma City. Approximately seven months before the United States formally entered World War II, 21 May 1941, the proposed installation was designated the Midwest Air Depot. Ground breaking ceremonies were conducted that same year, on 30 July 1941, with subsequent activation of the installation on 1 March 1942. During this same time period Midwest City sprang up as a new town to provide housing and community facilities for the new air depot. The original land acquisition for the new city consisted of 310 acres adjacent to, and north of, the new air maintenance and supply depot.

During the initial construction of the installation a nucleus of military and civilian personnel operated from a commercial building in downtown Oklahoma City. The first increment of personnel moved to the site on 20 July 1942 which, at that time, consisted of a base comprising 1,660 acres and 420 unfinished buildings. By August of that year supply and maintenance functions were on-site and operating at a furious pace. As the mission accelerated, so did employment. Civilian employment reached a World War II peak in October 1943 with 14,925 on the payroll. During World War II the Midwest Air Depot was responsible for reconditioning, modification and modernization of aircraft, vehicles and equipment. The geographical area for prime responsibility at the time consisted of Minnesota, Wisconsin, Iowa, Illinois, Missouri, Arkansas, Nebraska, Kansas, Oklahoma and that portion of Texas north of the r parallel, north latitude.

The depot was designated "Tinker Field" on 14 October 1942 in honor of Major General Clarence L. Tinker, a native of Oklahoma. The one-eighth Osage Indian was killed in action on 7 June 1942 while leading his bomber command on a strike against the Japanese at Wake Island.

Throughout the war years Tinker compiled an imposing record for its maintenance on B-24 Liberators, B-29s, B-17s, and thousands of aircraft engines. Though some 7,000 military and civilian personnel were separated following the war's conclusion, the base area expanded when the Douglas Aircraft Plant, located east of the north-south runway, was combined with the base. The base was officially dedicated "Tinker Field" on 18 November 1945. The installation at this time had a value of $55 million and was among the largest in the United States.

On 2 July 1946 Tinker Field became home to the Oklahoma City Air Materiel Area (OCAMA), following its parent command's redesignation as the Air Materiel Command (AMC). At about this time Tinker became involved in jet engine overhaul and, later, modification of aircraft out of storage in a huge program to rebuild the nation's airpower. The base's first peace time overhaul project was the preparation of "Dave's Dream", the "Enola Gay", and several other B-29s for the important Bikini atomic test program. Following creation of the Department of Defense, and the Air Force as a separate military establishment, on 13 January 1948 Tinker Field became "Tinker Air Force Base". Subsequently, the base became the worldwide repair depot for the B-36 aircraft, and its first jet aircraft, a B-45, plus a multitude of other weapons and engines.

The outbreak of hostilities in Korea in 1950 placed new demands on Tinker AFB. Maintenance and repair of aircraft increased 57 percent, largely in support of the Korean action. Furthermore, by August 1952, military and civilian personnel had grown to an all time high of almost 29,000. Concurrently, Tinker's air materiel headquarters responsibilities were enlarged. For example, in January 1954, OCAMA was assigned all logistics functions, from acquisition through operations, on the new B-52 bomber and also received like responsibilities on the C/KC-97 and B-47 aircraft. In the late 50's management of missiles was added to the logistics mission. Then, during the years 1961-1963, the installation became the specialized repair site for C-135 aircraft, airborne communications equipment, and became the single overhaul point for the J-57 engine and related accessories. In 1966 OCAMA gained the management assignment on the A-7 attack aircraft.

The United States' involvement in the Vietnam War had a major impact on OCAMA in the late 1960's. OCAMA managed, bought, repaired and stored dozens of weapons and prime items in support of that conflict. During the 1970's the installation took on new management responsibilities such as the B-1 Bomber, the F-101 engine, the AGM-86A missile and other items. Also, on 1 April 1974 the name of the command was again changed from OCAMA to the Oklahoma City Air Logistics Center (OC-ALC). This was in response to an Air Force reorganization that dissolved the Air Materiel Command and created the Air Force Logistics Command (AFLC). At this time the real estate value of Tinker AFB had risen to approximately $166 million.

Two important mission developments occurred during the 1980's. One was the arrival at Tinker AFB, on 1 April 1985, of the 552nd Airborne Warning and Control (AWAC) Wing, a component of the Tactical Air Command (TAC). The aircraft and airborne radar operated and maintained by the AWAC Wing can detect both air and seaborne objects over ranges exceeding 250 miles, thereby providing area and theater commanders with surveillance, warning, command, and control. The Wing operates on a worldwide basis providing vital support to efforts as diverse as the anti-narcotics program to the Persian Gulf operations of Desert Shield and Desert Storm.

Another important development at Tinker during the 1980's was the increased emphasis on environmental management. Beginning in the early 80's with a small staff in the Office of the Base Civil Engineer a separate Directorate of Environmental Management (EM) was formed in 1985. The new Directorate grew rapidly as it incorporated functions related to environmental laws such as the Clean Air Act, Clean Water Act, RCRA, CERCLA, and TSCA. As early as 1983 the Air Force Installation Restoration Program (IRP) began instituting measures to clean-up past contaminated sites at Tinker AFB. Two sites, Building 3001 and Soldier Creek, have been listed on the National Priority List (NPL). Tinker has entered into a Federal Facilities Agreement with EPA and the State of Oklahoma to remediate these sites and to manage its waste water treatment plant. The base was issued a "Part B" RCRA permit on July 1, 1991, and is now applying for approval of its RCRA Facility Investigation Workplan. A RCRA Facility Assessment (RFA) conducted in May 1989 identified 80 Solid Waste Management Units (SWMUs), and 19 Areas of Concern (AOCs). The directorate has grown to approximately 80 personnel and in 1992 established close working relationships with the Bioenvironmental Office and the Office of Safety.

In 1990 the OC-ALC underwent a fundamental reorganization based on "product line" organization rather than that of "function". Thus, Directorates of Maintenance, Material Management, and Plans and Programs were dissolved in favor of such Directorates as: Aircraft, Propulsion, Commodities, and Human Resources. This "product oriented" concept was based on private industry experience which suggested that such organization helped eliminate "turf battles" and built a sense of personal ownership in the work force. Figure 3: OC-ALC Organization Chart explains the current structure.

In response to the end of the "Cold War" and the downsizing of the entire military structure, other major organizational changes occurred in 1992. Of most importance to the OC-ALC is the fact that on 1 July 1992 its parent command, the Air Force Logistics Command (AFLC), was merged with the Air Force Systems Command (AFSC) to form a new command entitled the Air Force Materiel Command (AFMC). This new command comprises 52 percent of the Air Force budget. Eighteen percent of all Air Force personnel and 42 percent of the civilian work force are assigned to the new command.

In spite of military budget downsizing Tinker AFB has acquired maintenance and repair responsibility for the B-2 Stealth Bomber and its counterpart, the F-118 Stealth Fighter.

Also during 1992, the 50th anniversary year of Tinker AFB, an event of historic implications took place by the installation of a major Navy unit at an Air Force base. This unit is the L-62 Strategic Communications Wing which is composed of two squadrons of aircraft that maintain Very Low Frequency (VLF) communications with the Navy's ballistic missile carrying submarines. The E-6A Hermes aircraft that serve as platforms for the VLF equipment are similar to the Etches aircraft and the C-135 aircraft for which Tinker already has primary maintenance and repair responsibility. This fact, plus the mid-continent location (both Pacific and Atlantic fleets can be serviced) were reasons for choosing Tinker as the main operating base.

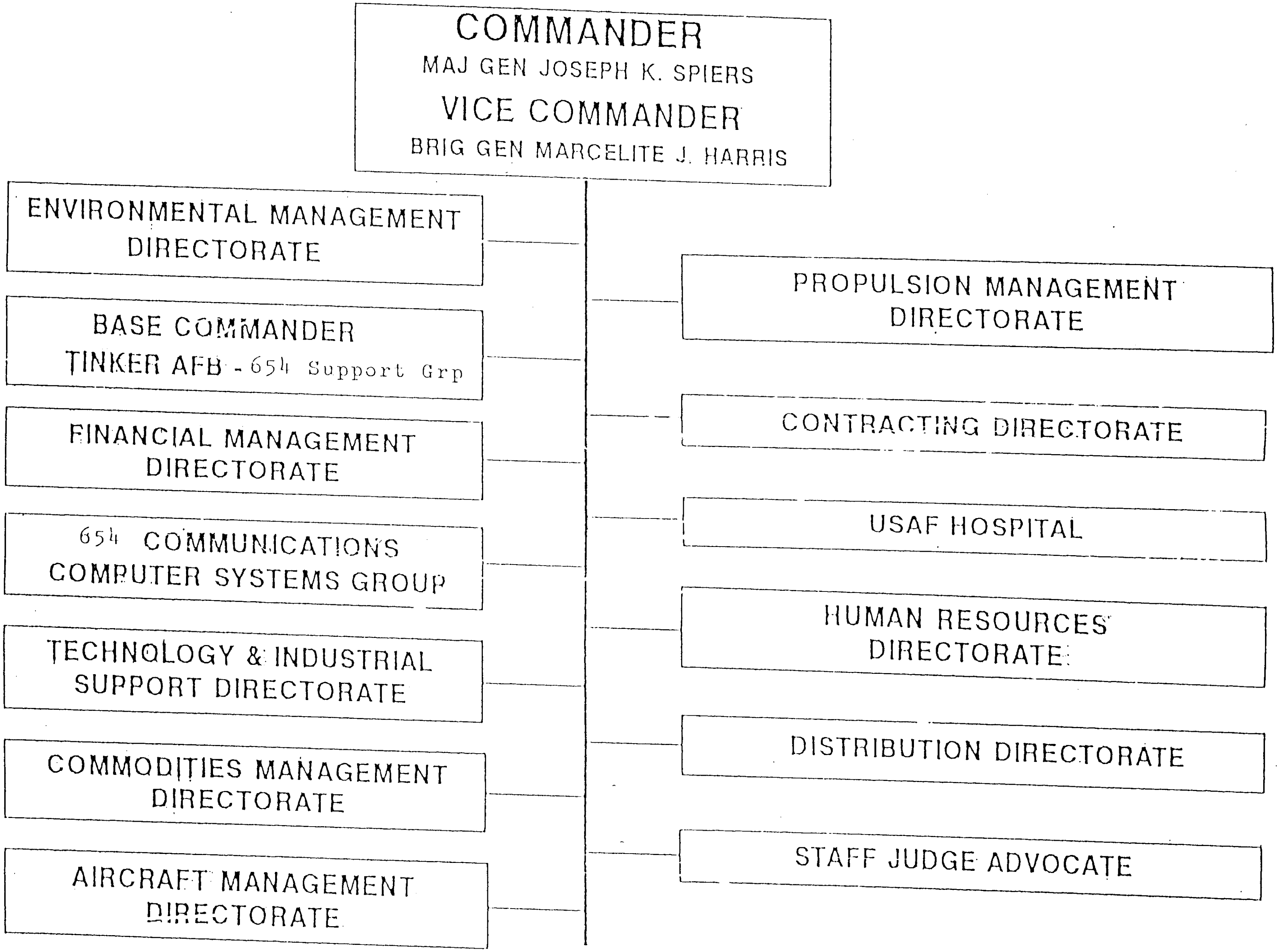


Figure 3 : OC/ALC Organization Chart

4.0 LAND ACQUISITION

The original site of the Midwest Air Depot, as the installation was called at the time (May, 1941), consisted of 960 acres that were donated by the City of Oklahoma City. However, by the time construction had proceeded to the point where operations could commence in July, 1942, additional land acquisition had raised the acreage to 1,660. The location and progress of land acquisition can be seen on Figure 4: Land Acquisitions; and on Figure 5: Township/Range Designations.

4.1 PURCHASED LANDS

During the 1950's important land acquisitions were made in three areas. South of 59th Street approximately 300 acres of land were purchased to enable extension of the main N-S runway. One-half mile east of Douglas Boulevard, again on the south side of 59th Street, approximately 89 acres were purchased for use by the Engineering Installation Division (EID), an Air Force communications unit. This site is variously known as the Tinker Support Annex, or as "Area D". Another small parcel about one-half mile farther east was purchased at the same time. This is known as the Tinker Training Annex, or the "Gator Site". With the acquisition in 1958 of a 638 acre tract of land immediately

west of the original air base, development of new permanent military housing and community support facilities commenced. Included in the development, at that time, were a 75-bed hospital, dental clinic, officer quarters, 268 Capehart-Act family residences, airmen dormitories and a dining hall.
By 1980 additional land had been purchased in the southwest part of the base, partly for use as base housing, and small parcels at the northeast corner primarily for use as parking space for employees.

During the 1980's parcels of land were purchased along the south side of the base for use of: (1) armament storage, (2) Etches Wing, (3) Navy, and (4) DRMO. See Figure 4.

In the decade of the 1990's land purchases in two areas have been made. See Figure 4. The 15 acre area in the Northeast corner of the base will be used to construct a centralized computer facility for Tinker AFB and a child care center for Tinker employees. The 13 acre area on the east side of Douglas Blvd. will be used to construct a new "engine fuel control and accessory test facility". The dotted 24 acre area at the southwest corner of the base has not been purchased at the time of this writing, however, it is expected that the transaction will be completed in the near future. This is the proposed site of two new facilities. One of these will be a less-than-90 day storage facility for hazardous waste that will replace two sites now located at Building 3125 and 1005. The other facility will be a new hazardous waste storage facility for the use of DRMO that will replace the existing Buildings 3728 and 3770. Use of this facility will be contingent upon successfully modifying Tinker's "Part B" permit.

The above land acquisitions add to a present total of 4517 acres, or 4541 acres if the acquisition at the southwest corner takes place.

4.2 LEASED LANDS

In addition to land actually owned by Tinker AFB other lands are being leased for various purposes. The largest of these is Glenwood, a 360 acre area north of Interstate 40 and directly in-line with the main N-S runway. In 1973 Oklahoma County residents overwhelmingly voted approval of $10.8 million in bonds to clear this housing area under the northern approach to the base's primary runway. The area, approximately 3,000 feet wide by a mile in length, comprised of 836 houses, one school, and other land historically presented the only hazard to Tinker's flying operations and had long been a concern to residents and base officials alike. The clearance project began in the summer of 1973. The area remains clear to this day and is periodically inspected for encroachment.

Another leased area of 40 acres lies just to the west of the Tinker Support Annex (Area D) on the south side of SE 59th Street. The primary use of this area was as a solid waste landfill in the 1950's and 1960's. It is now closed and capped and is not being used for any other purpose. A third leased area of 80 acres is called Douglas Field, or Training Area, and is located east of Douglas Blvd. and north of SE 74th Street (N/2 SW/4 Sec 25). Like the "Gator Site" this area is used for various training exercises for troops at Tinker AFB. Finally, a six acre site directly south of the south end of the N-S runway is leased to support aircraft navigational instruments (Tinker Middle Marker).

The above leased areas total 486 acres. Thus, a total of 5003 acres of land is presently under Tinker AFB jurisdiction.

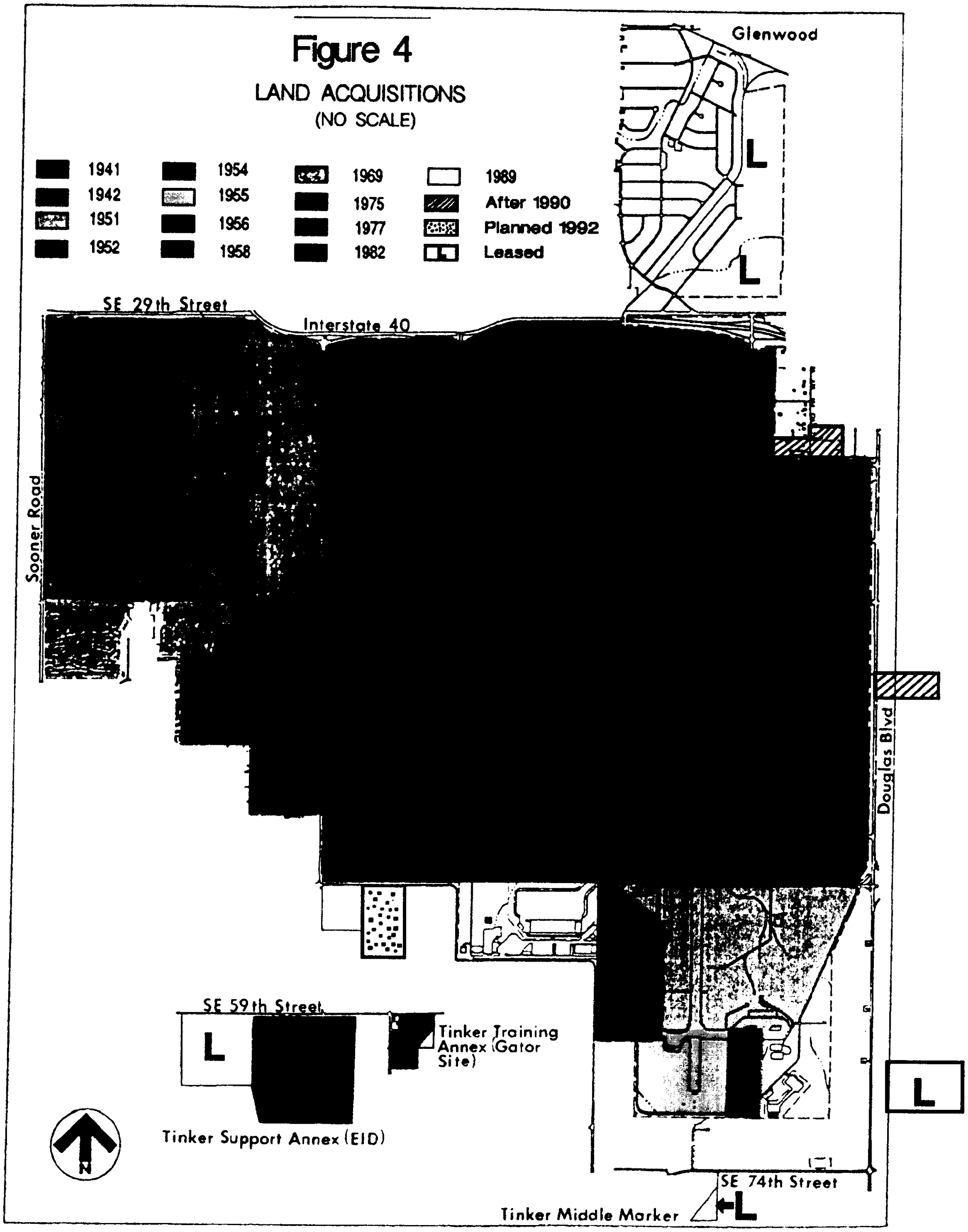
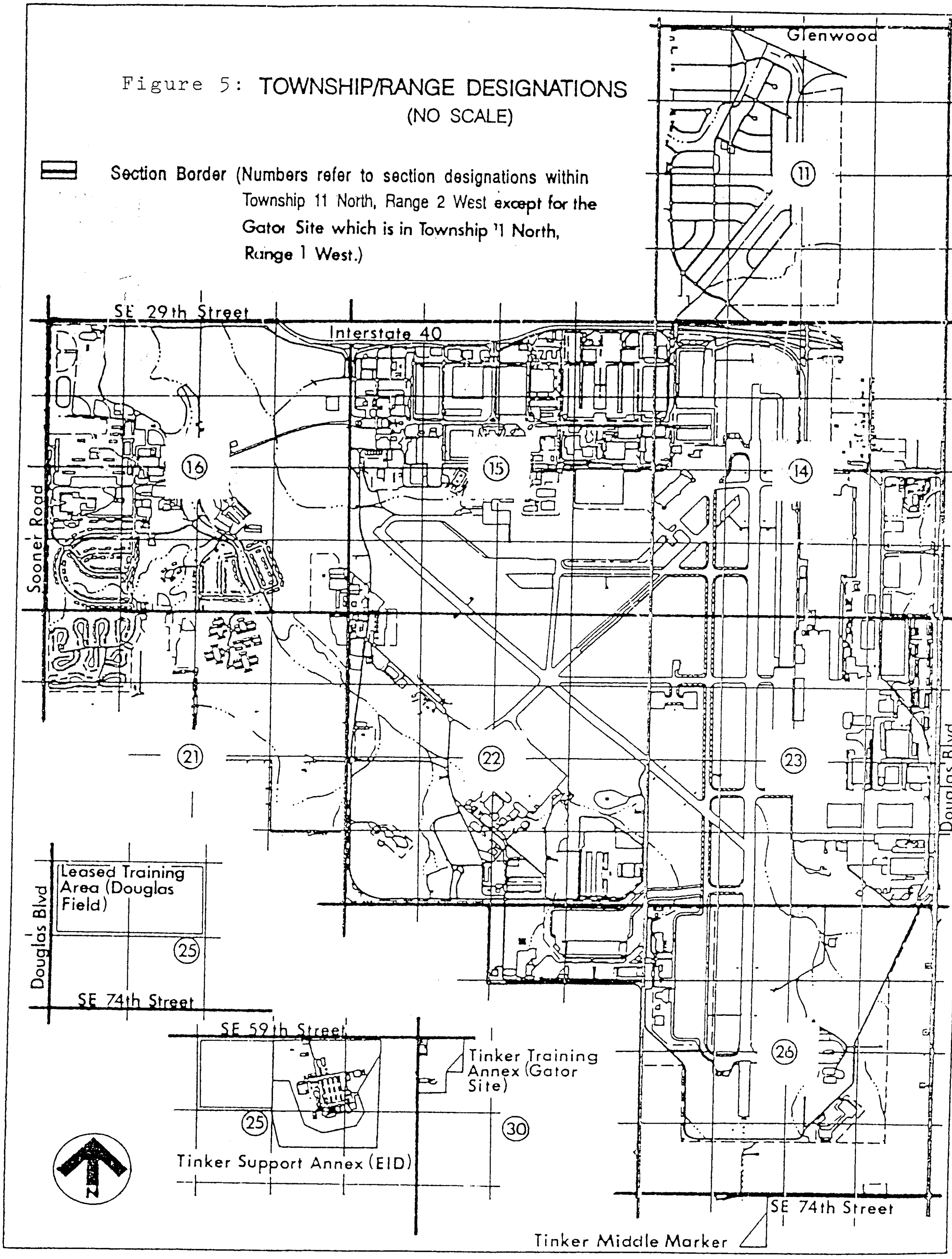


Figure 4
LAND ACQUISITIONS
(NO SCALE)

Figure 5: TOWNSHIP/RANGE DESIGNATIONS

(NO SCALE)

Section Border (Numbers refer to section designations within Township 11 North, Range 2 West except for the Gator Site which is in Township 11 North, Range 1 West.)



5.0 BOUNDARY FEATURES

5.1 LAND USE

As shown on Figure 1: General Location, Tinker AFB is surrounded by three municipalities: Del City on the northwest, Midwest City on the North, and Oklahoma City on the east, south, and southwest. A map compiled by the Base Civil Engineering Office that details land use outside base boundaries is shown in Figure 6: Land Use Near Tinker AFB. The areas comprising Del City and Midwest City are rather heavily populated commercial and residential. Much of the area under Oklahoma City jurisdiction, however, is devoted to agricultural use, or only light residential. One exception is the General Motors automobile plant which lies south of the central part of the base. Included in this complex are one large manufacturing building, a wastewater treatment plant, parking lots for both employees and newly built automobiles, and a multi-branched railhead for in-shipment of parts and out-shipment of new automobiles.

The north end of Lake Stanley Draper, a large recreational and water supply reservoir, lies about one-half mile south of the southeast corner of Tinker AFB. A small portion of its drainage basin lies within Tinker AFB boundaries.

5.2 LAND OWNERSHIP

The ownership of land at the boundaries of Tinker AFB was obtained from the Office of the Oklahoma County Clerk, Registrar of Deeds; 320 Robert S. Kerr Ave., Room 105, Oklahoma City, OK 73102. Land is divided into lots that are depicted on one-quarter section plat maps. These plats are numbered sequentially on an index map. The plats surrounding Tinker AFB are shown on Figure 7: Land Plat Maps at Boundaries of Tinker AFB. Section numbers and the boundaries of Tinker AFB are also shown. Each plat is divided into parcels of land that may or may not be subdivided into blocks and lots. Undivided parcels are given a general index number such as: 15-025-1700. Subdivided parcels are broken into Blocks and the blocks into Lots so that a particular piece of land may be described as: Lot 10 of Block 6.

To find the actual owner one must go to the "Registrar's List of Current Owners". This list includes the name and address of the current owner for each piece of land depicted on the plat maps and a legal description of the land's location. The information given on Appendix A: Land Ownership at Boundaries of Tinker AFB, was taken from the Registrar's list in October 1991. That information includes only the land actually adjoining Tinker AFB property.

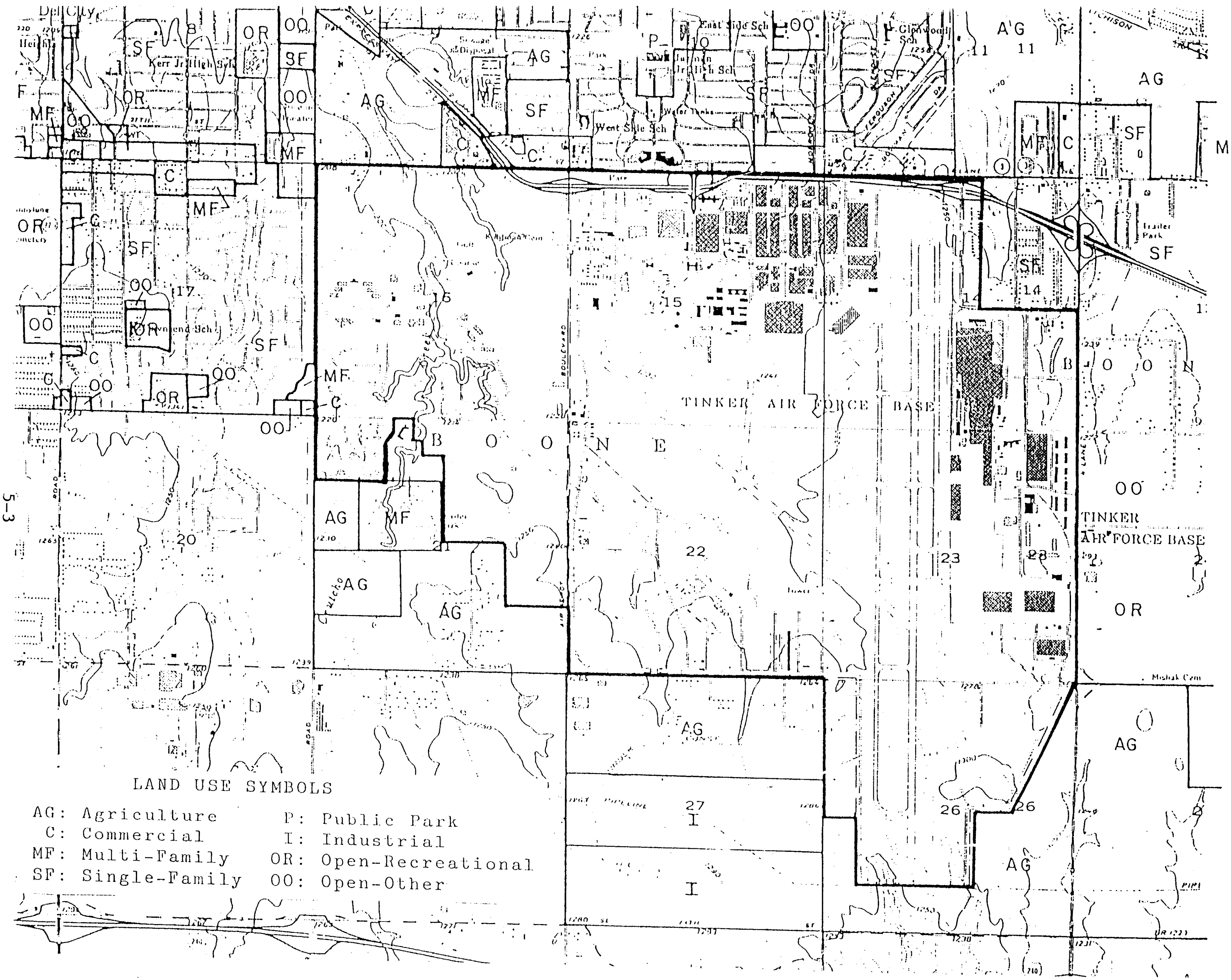


Figure 6: Land Use Near Tinker AFB

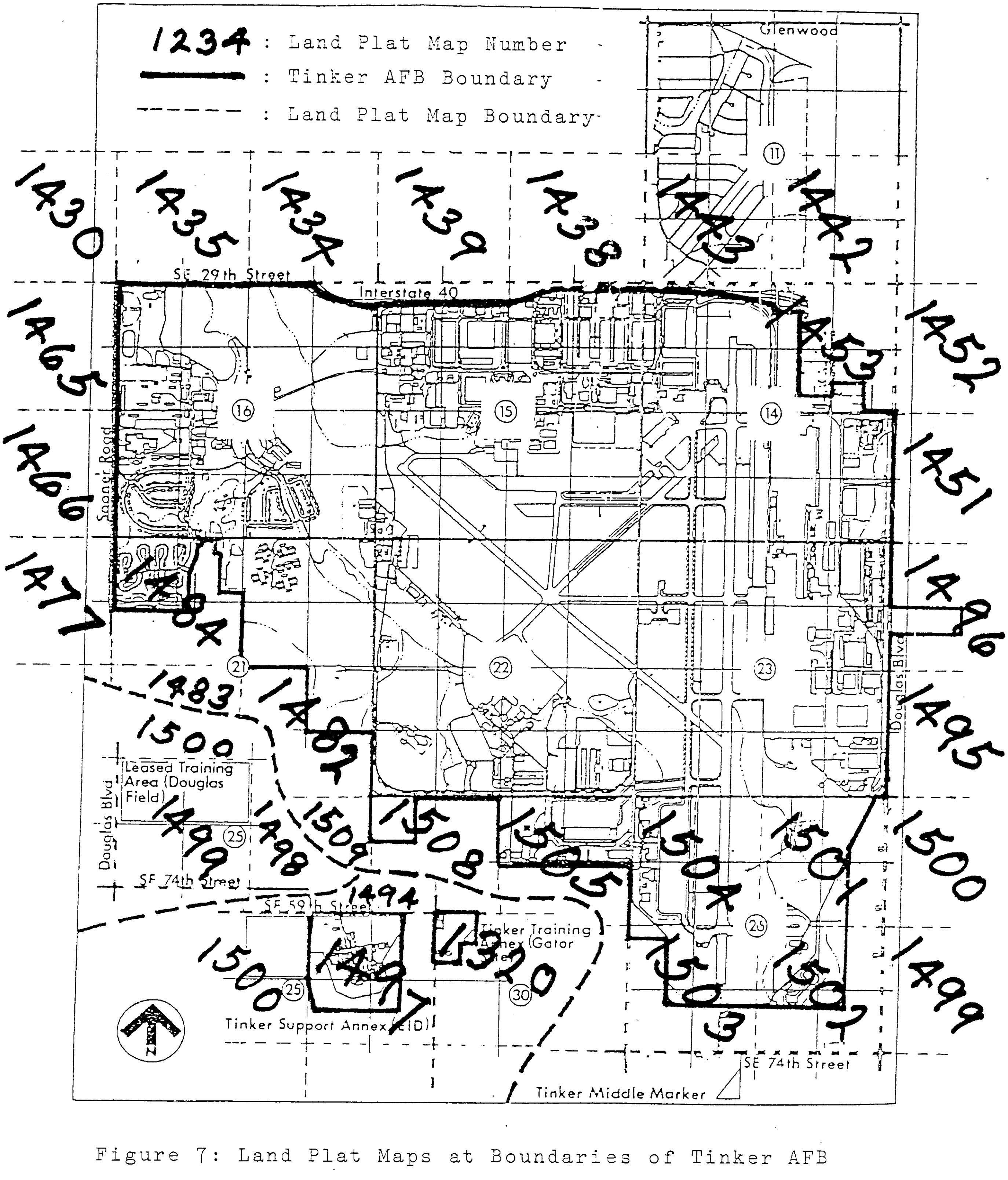


Figure 7: Land Plat Maps at Boundaries of Tinker AFB

6.0 ENVIRONMENTAL SETTING

The environmental setting of an area is composed of many factors that create a unique set of living conditions when they interact and exert their influence. These include climate, air quality, moisture availability, soil types, geologic history, biological activity, industrial activity, and others. Numerous studies of the influence of these factors in central Oklahoma have been conducted by universities, federal and state agencies, and commercial organizations. The following information is based upon some of those studies. Table 1: References of Environmental Studies, lists the primary ones used.

6.1 GEOGRAPHY

The Oklahoma City area is located within the Central Redbed Plains section of the Central Lowland Physiographic Province (Curtis and Ham, 1972). The area is characterized by nearly level to gently rolling hills, broad flat plains and well-entrenched main streams. The valleys of secondary streams may exhibit a sag and swale appearance, indicative of the erosion of somewhat cohesive residual soils.

6.2 TOPOGRAPHY

The topography of Oklahoma City and surrounding area varies from generally level to gently rolling in appearance. Local relief is primarily the result of dissection by erosional activity or stream channel development. At Oklahoma city, surface elevations are typically in the range of 1,070 to 1,400 feet MSL. At Tinker Air Force Base ground surface elevations vary from 1,190 feet MSL near the northwest corner where Crutcho Creek intersects the base boundary to approximately 1,320 feet MSL at Area D (EID), located on 59th Street, east of the main installation. See Figure 8: Topography of Tinker AFB.

6.3 SURFACE DRAINAGE

Drainage of Tinker Air Force Base land areas is accomplished by overland flow of runoff to diversion structures and thence to area surface streams, which flow intermittently. The northeast portion of the base is drained primarily by unnamed tributaries of Soldier Creek, a tributary of Crutcho Creek. The north and west sections of the base including the main instrument runway, drain to Crutcho Creek, a tributary of the North Canadian River. Two small unnamed intermittent streams crossing installation boundaries south of the main instrument runway generally do not receive significant quantities of base runoff due to site grading designed to preclude such drainage. These streams, when flowing, extend to Stanley Draper Lake, approximately one half mile south of the base. Installation drainage and the flow directions of surface streams are depicted on Figure 9: Installation Surface Drainage.

6.4 SOIL CHARACTERISTICS

The surface soils of Tinker Air Force Base have been studied by the USDA, Soil Conservation Service (1969) and by several soil boring projects conducted for geotechnical (foundation construction) investigations. Three major soil associations have been mapped within installation limits and are depicted on Figure 10: Distribution of Soils at Tinker AFB. The individual soil types are summarized on Table 2: Tinker AFB Soil Associations. The surface soils of the installation area are predominantly of two basic types: residual and alluvial. The residual soils associations, Darrell-Stephenville and Renfrow-Vernon-Bethany are the product of the weathering of underlying bedrock. The alluvial materials are stream-deposited silts and sands, whose occurrence is typically restricted to the floodplains of area streams.

6.5 GEOLOGY

Stratigraphy: Tinker AFB lies atop a sedimentary rock column several thousand feet thick composed of strata, primarily marine in origin, that ranges in age from Cambrian to Permian above a Precambrian igneous basement. Some Quaternary alluvium and terrace deposits can be found in and near present day stream valleys. Geologic units appearing on the surface are summarized as Table 3: Major Geologic Units of Oklahoma County. The Quaternary deposits are highly unsorted and unconsolidated while the Permian Strata consist of layered and consolidated rock material. Sandstone units tend to be lenticular in nature, forming where interconnected, pathways for groundwater movement. The physical distribution of surface geologic units relevant to Tinker AFB are mapped as Figure 11: Geologic Map of Tinker AFB, which has been modified from the work of Bingham and Moore (1975). These geologic units are summarized on Table 4: Tinker AFB Geologic Units (Permian). Generally, the surficial geology of the north section of the base is dominated by the Garber Sandstone, which crops out across a broad area of Oklahoma County. The southeast portion of the base is covered by a veneer of the Kingman Siltstone and the Fairmont Shale. (Miser 1959, and Bingham & Moore 1975). Drilling information obtained as a result of geotechnical investigations and monitoring well installation indicates the presence of these formations separating surface soils from the underlying Garber Sandstone. They appear, however, to be thin and/or discontinuous.

Depositional Environment: The Permian strata presently exposed at the surface in central Oklahoma were deposited along a low-lying north-south oriented coastline. Land features included meandering to braided sediment loaded streams that flowed generally westward from highlands to the east (ancestral Ozarks). Sand dunes were common as were cut-off stream segments that rapidly evaporated. The climate was arid and vegetation sparse. Off shore the sea was shallow and deepened very gradually to the west. The shore line position varied over a wide range. Isolated evaporitic basins frequently formed as the shore line shifted.

This depositional environment resulted in an interfingering collage of sands, clays, shallow marine shales, and evaporite deposits. The over loaded streams and evaporitic basins acted as sumps for heavy metals such as iron, chromium, lead, and barium. Oxidation of iron in the arid climate resulted in the reddish color of many of the sediments. Erosion and chemical breakdown of granitic rocks from the highlands resulted in extensive clay deposits. Evaporite minerals such as anhydrite ($CaSO_4$), barite ($BaSO_4$), and gypsum ($CaSO_4$+$2H_20$) are common. The conditions produced a peculiar variety of barite that, because of its crystal structure, resembles a rose flower in appearance. Only very fine grained material reached the marine environment resulting in thin but wide spread layers of shale and siltstone interspersed with occasional coarser grained sandstone lenses.

Structure: Tinker Air Force Base lies within a tectonically stable area. However, occasional mild earthquakes have been recorded that emanate from the buried Nemaha Ridge that extends across the eastern part of Oklahoma in a SSW direction. Typical Richter Scale magnitudes are less than 4. No major near-surface faults or fracture zones have been mapped near the base. Most of the consolidated rock units of the Oklahoma City area are nearly flatlying. The regional dip is forty feet per mile in a generally westward direction. (Bingham and Moore, 1975).

6.6 GROUND WATER HYDROLOGY

Ground water hydrology of the Tinker Air Force Base - Oklahoma City area has been reported by Jacobsen and Reed (1949), Wood and Burton (1968), Bingham and Moore (1975), Bedinger and Sniegocki (1976) and Wickersham (1979). Additional information has been obtained from interviews with officials of the Oklahoma Water Resources Board and the District Office, U.S. Geological Survey Water Resources Division.

Tinker Air Force Base lies within the limits of the Garber-Wellington Ground-Water Basin. The Garber Sandstone and the Wellington Formation are considered to be a single aquifer and provide the most significant source of ground-water supplies in the Oklahoma City area. At the present time, Tinker Air Force Base derives most of its water supplies from this aquifer and supplements the supply by purchasing from the Oklahoma City Water Department. The nearby communities of Midwest City, and Del City derive water supplies from both surface sources and wells tapping the aquifer. Industrial operations, individual homes, farm irrigation, and small communities not served by a municipal distribution systems also depend on the Garber-Wellington Aquifer. Communities presently depending upon surface supplies such as Oklahoma City also maintain a well system drilled into the Garber- Wellington as a standby source of water in the event of drought. The aquifer area is depicted on Figure 12: Garber-Wellington Aquifer.

The Garber Sandstone and the Wellington Formation are considered to be a single aquifer as they were deposited under similar conditions and consist of lenticular beds of sandstone, siltstone and shale that tend to vary to thickness over relatively short horizontal distances (Wood and Burton, 1968). The sediments constituting the aquifer tend to be loosely cemented and have a maximum thickness of some 1,000 feet. In the area of outcrop, ground water occurs under water table (unconfined) conditions and may occur at relatively shallow depths below ground surface (100 to 150 feet). In areas overlain by younger geologic units, ground water occurs in the aquifer under artesian (confined) conditions and wells must be drilled deeper (200-250 feet), (Wickersham, 1979).

The Garber-Wellington formations are exposed at ground surface or mantled by a thin soil over the northern one-half of Tinker Air Force Base. It is believed that the formations are overlain by a thin, discontinuous sequence of Hennessey Group sediments (Kingman Siltstone and Fairmont Shale) over the southern portion of the base. Water in the Garber-Wellington is normally encountered at a depth of some 100 feet at Tinker Air Force Base. Figure 13: Log of Well No. 1, a soil sample log from water supply well #1, depicts local hydrogeology. A geologic cross-section of base wells developed by Wickersham (1979) is presented as Figure 14: Geologic Section of the Garber-Wellington Aquifer at Tinker AFB. This figure graphically depicts the lenticular nature of the sandy zones. Although most of the aquifer is believed to be saturated, multiple screened wells are usually constructed in order to obtain water from the more productive zones.

Recharge of the Garber-Wellington Aquifer is accomplished principally by percolation of surface waters crossing the area of outcrop and by rainfall infiltration in this same area. Because most of Tinker Air Force Base is located in an aquifer outcrop area, it is believed that this portion of the base is situated in a recharge zone, (Havens, 1981). The aquifer is susceptible to contamination in the study area. Ground-water levels and flow directions (1976 data) are presented as Figure 15: Ground Water Levels and Flow Directions. According to the indicated hydraulic gradients, ground-water flow at Tinker AFB is presently directed to the northwest and south.

According to Wood and Burton (1968) and Wickersham (1979), the quality of ground water derived from the Garber-Wellington Aquifer is generally good, although wide variations in the concentrations of some constituents are known to occur. Wells drilled to excessive depths may encounter a saline zone, generally greater than 900 feet below ground surface. Wells drilled to such depths or those accidentally encountering the saline zone are either grouted over the lowest screens or may be abandoned.

Tinker Air Force Base presently obtains its water supplies from a distribution system comprised of 29 water wells constructed along the east and west base boundaries, as shown by Figure 16: Monitoring Well and Boring Locations, and by purchase from the

Oklahoma City Water Department. All base wells are finished into the Garber-Wellington Aquifer. Base wells range from 700 to 900 feet in finished depth, with yields ranging from 205 to 250 gallons per minute. The wells incorporate multiple screens, deriving water supplies from sand zones that vary in thickness from 103-184 feet (Wickersham, 1979). Information about the surface elevation, top of casing, depth, and screened interval of various monitoring wells and water supply wells is outlined in Appendix B: Monitor and Water Supply Well Data.

Shallow aquifers exist temporarily in zones of alluvium that border streams, or where sandy residual soils overly bedrock at shallow depths. Soil aquifers are typically recharged directly by precipitation, gradually running dry seasonally as base flow to local streams and recharging of underlying rock aquifers deplete limited supplies. The significance of shallow aquifers is that they may facilitate the contamination of important lower aquifers or surface waters by generation and mobilization of wastes. Shallow aquifers may not facilitate the detection of developing ground-water contamination problems because of their localized nature and ephemeral character. It is not known, to what degree if any, these aquifers communicate with base surface waters.

6.7 SURFACE WATER QUALITY

Tinker AFB has several streams and surface drainage systems which originate or flow through the base property. See Figure 2. These streams have been monitored routinely at several locations by the base Bioenvironmental Engineering Office (SGB). In addition, special sampling studies have been conducted by the US Geological Survey, Oklahoma Water Resources Board and by Frank, 1969. During the summers of 1990 and 1991 surface water sampling was conducted on the east and west branches of Soldier Creek (BV Waste Science and Tech Comp, Jan 92). The latest stream sampling project was completed in May 1992 on Crutcho, Kuhlman, and Elm Creeks (Halliburton NUS, 1992). The data are discussed in the following paragraphs by sub-basins.

Crutcho Creek and its tributaries traverse the southern and western portions of the base. The earlier water quality data evaluated (USGS data collected during 1963) revealed lead values of 45 μg/l. Data collected from Crutcho Creek in 1968 (Frank, 1969) indicated concentrations of total chromium ranging from 50 to 1,800 μg/l and concentrations of cadmium ranging from 80 to 300 μg/l. Data collected by the base Bioenvironmental Engineering Office (SGB) in 1980 indicated the levels of chromium were typically below 50 μg/l (the detectable limit of the test procedure used). Cadmium concentrations for Crutcho

Creek were consistently below 10 $\mu g/l$ during 1980. May 1992 samples indicated three metals above detection limits: arsenic 2.5 ppb, Barium 1040 ppb, and zinc 11 ppb. No semi volatile organics above detection limits were found. Except for two that were determined to result from laboratory contamination all volatile organics were also below detection limits. No pesticides, herbicides, or PCBs were found.

Kuhlman Creek originates on base from surface drainage and storm runoff and drains the north central portion of the base. The 1963 USGS data revealed chromium values of 129 $\mu g/l$ and cadmium values of 26 $\mu g/l$. The 1980 data showed iron concentrations ranged from 0.12 to 3.1 mg/l and manganese concentrations ranged from <0.050 to 4.5 mg/l. On occasions, oil and grease were also detected in the 1980 samples.

No metals or organics were found above detection limits in the May 1992 samples. One sample detected the pesticide, Dursban, at 6.1 ppb, apparently a result of surface runoff from a nearby storage building that had recently been treated for insect control. No herbicides or PCB, were found.

West Soldier Creek originates on base and drains the northeast portion of the base. The 1963 USGS data revealed high metals contamination in the creek. The cadmium concentration was in the range of 46,000 μg/l and the chromium concentration was in the range of 31,000 μg/l. Aluminum, iron manganese and nickel were also analyzed and their respective concentrations were 620, 540, 1,400 and 242 μg/l. These high metals concentrations may have originated from direct discharge of industrial wastes and industrial spillage into the stream. By 1968, the surface water discharge contained chromium and cadmium concentrations of 7,200 μg/l and 2,000 μg/l respectively (Frank, 1969). The 1979 SGB data indicated a significant reduction of chromium and cadmium concentrations had occurred in the creek. Occasionally elevated levels of oil and grease and phenol were detected.

Surface water sampling conducted in 1990 and 1991 detected several metals including arsenic, barium, chromium, cadmium, nickel and silver. All were determined to be consistent with background values. Volatile organics detected included methylene chloride, chloroform, acetone, and 1,2-dichloroethane at 14 ppb. The source of the contamination was suspected to be the adjacent N-S main runway. Concentrations were generally higher on-base than off-base. The semi-volatile organics were detected, bis(2-ethylhexyl)phthalate being the highest concentration at 8 ppb no trends or sources could be established.

East Soldier Creek originates on base and drains the eastern portion of the base. The domestic and industrial wastewater treatment plants presently contribute the majority of the creek's flow. The 1963 USGS data revealed chromium concentrations of 2,950 $\mu g/l$ and cadmium concentrations of 2,180 $\mu g/l$. Nickel and manganese were detected at 129 and 58 $\mu g/l$ respectively. The 1968 University of Oklahoma data detected chromium concentrations within the range from 200 to 6,500 $\mu g/l$ and iron range from 0.44 to 14 mg/l. SGB data collected in 1980 detected consistently high concentrations of total chromium; however hexavalent chromium, the valence state considered to be toxic, was consistently below the primary drinking water standard (50 $\mu g/l$). Cadmium concentrations were at or below the 10 $\mu g/l$ drinking water standards. Nickel was the only parameter which was consistently detected at levels higher than the EPA ambient water quality criterion of 13.4 $\mu g/l$.

The sampling conducted in 1990 and 1991 detected several metals including arsenic, barium, chromium, cadmium, nickel and silver. Their concentrations, however, were determined to be consistent with background. Several volatile organics were detected including methylene chloride, acetone, chloroform, perchloroethane, and toluene. Concentrations ranged from a high of 6 ppb on base to 60 ppb off base. It was concluded that the much higher off base contamination was due to off base sources. Three semi-volatile organics were detected, the highest concentration being bis(2-ethylhexyl)phthalate at 14 ppb. No trends or sources could be established for these ion concentrations.

Analysis of one sample from Elm Creek detected the element vanadium at 10 ppb in the May 1992 sampling project. No organics, pesticides, herbicides, or PCBs were found.

6.8 METEOROLOGY

Climatic Data: Temperature, precipitation and other relevant data furnished by the 654th Base Weather Station, Tinker AFB, is presented in Table 5: Summary of Weather Data at Tinker AFB, OK. The indicated period of record is 30 years. The summarized data indicate that mean annual precipitation is 32.4 inches and that mean annual snowfall is eleven inches. According to the Climatic Atlas of the United States, annual lake evaporation for the Oklahoma City area is estimated to be 60 inches. Thus, Tinker AFB is located in a water deficient zone of the United States. Precipitation events releasing as much as 6.2 inches of rainfall in a twenty-four hour period have been reported, causing local flooding (654th Base Weather Station data).

Air Quality: There are over 250 stationary air emission sources located at Tinker AFB. These emission sources currently operate in a "low requirements" regulatory structure which is afforded by Oklahoma County's status of attainment with current National Ambient Air Quality Standards. Most of the sources are "grandfathered" and the compliance requirements for these sources is satisfied by providing an annual emissions summary to the Oklahoma State Department of Health (OSDH). Sources which have been added to TAFB's inventory of air pollution units since promulgation of permitting regulations are required to be subjected to OSDH scrutiny via "Permit to Construct" application submittals. See Appendix C to review a current list of air emission permits.

Permit processing, maintenance of permits and conveyance of permit conditions to air emission source operators has been enhanced with the incorporation and use of the Air Quality Utility Information System (AQUIS). This new air program management system will help TAFB in managing the new requirements levied by the Clean Air Act Amendment of 1990, especially in regards to air toxics, and the requirement to permit existing sources (grandfathering repealed). Generally, air pollution sources are being operated and maintained in a manner that reduces the amount of emissions presented to the environment.

The Directorate of Environmental Management at Tinker AFB is taking positive steps in regards to posturing for future regulatory requirements. Most notable is the undertaking of a comprehensive air toxics inventory whereby levels of ambient toxics can be assessed (per source) and will detail the performance requirements of potential control measures.

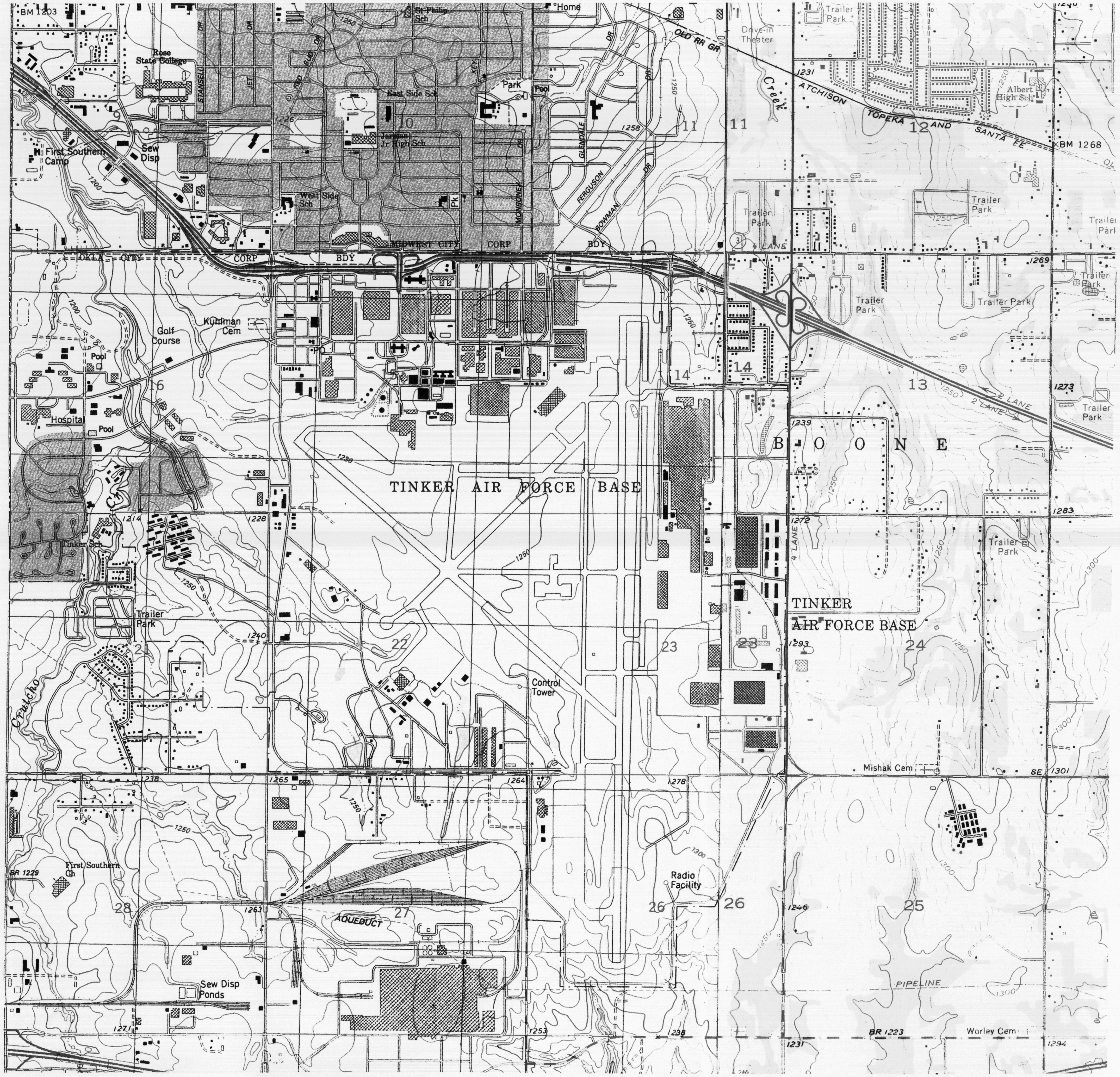


FIGURE 8

TOPOGRAPHY
(SCALE: 1" = 2000')

10-foot contour Intervals

Source: U.S. Geological Survey

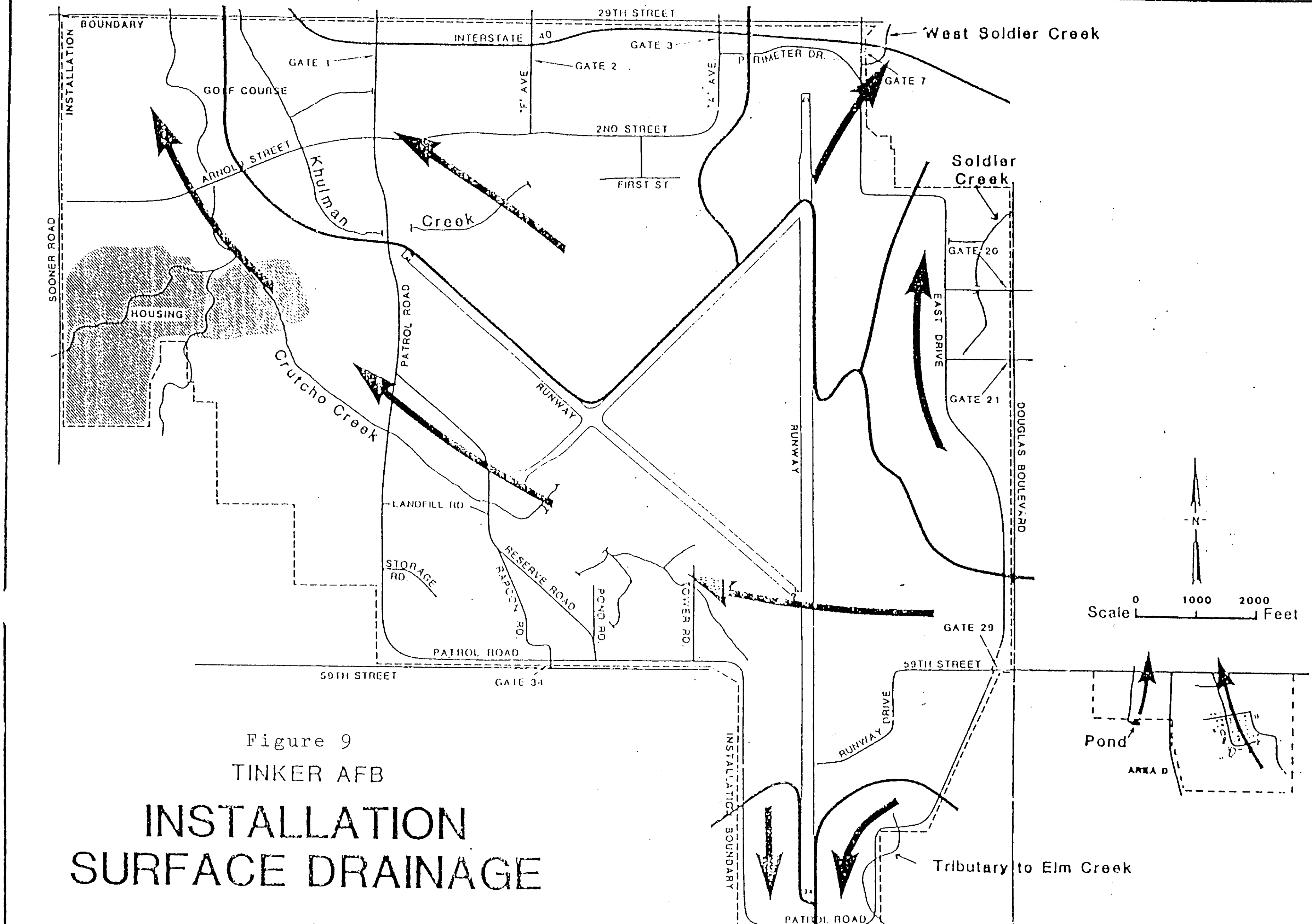
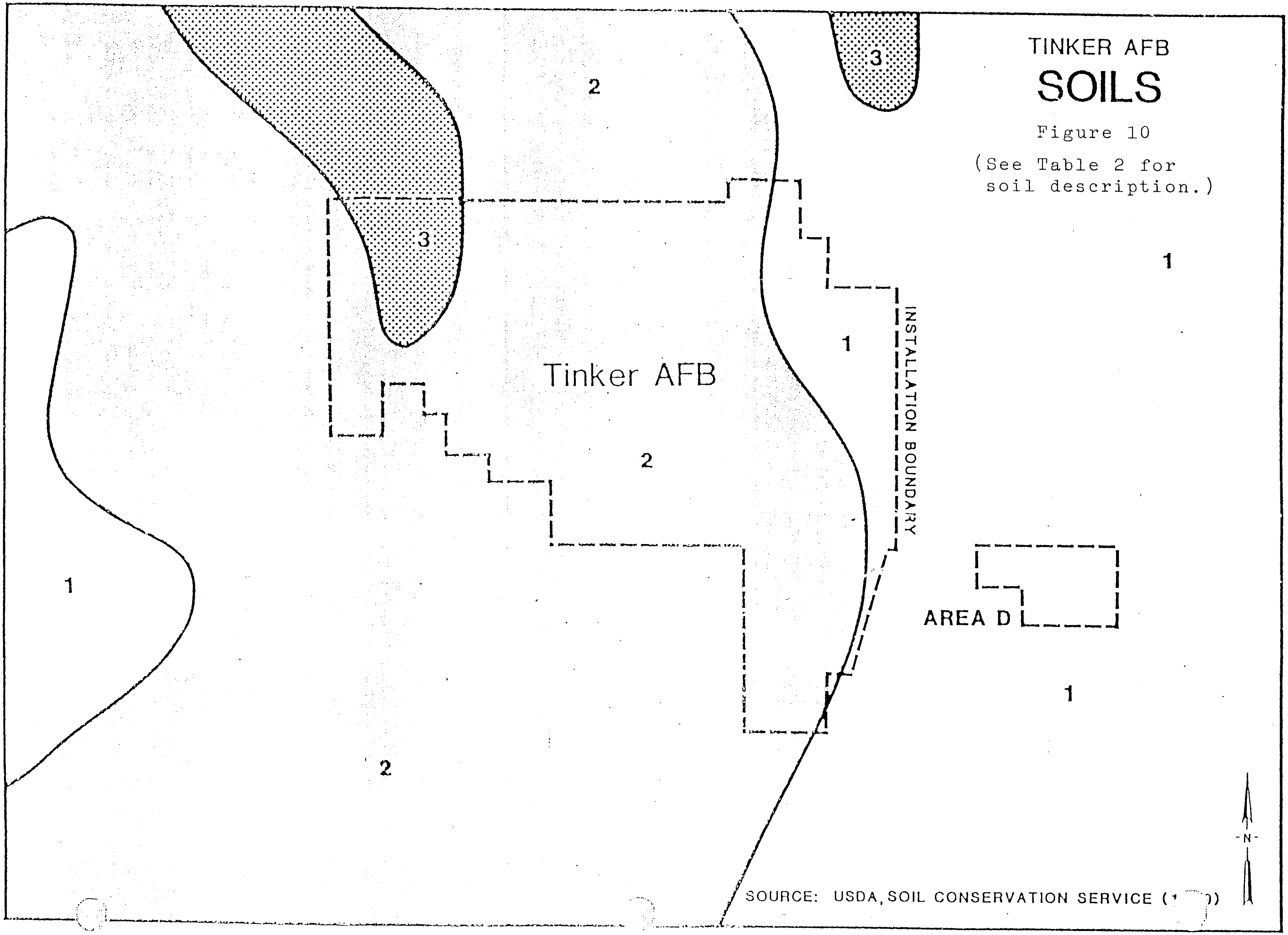


Figure 9

TINKER AFB

INSTALLATION SURFACE DRAINAGE

SOURCE: TINKER AFB DOCUMENTS



TINKER AFB
SOILS
Figure 10
(See Table 2 for soil description.)

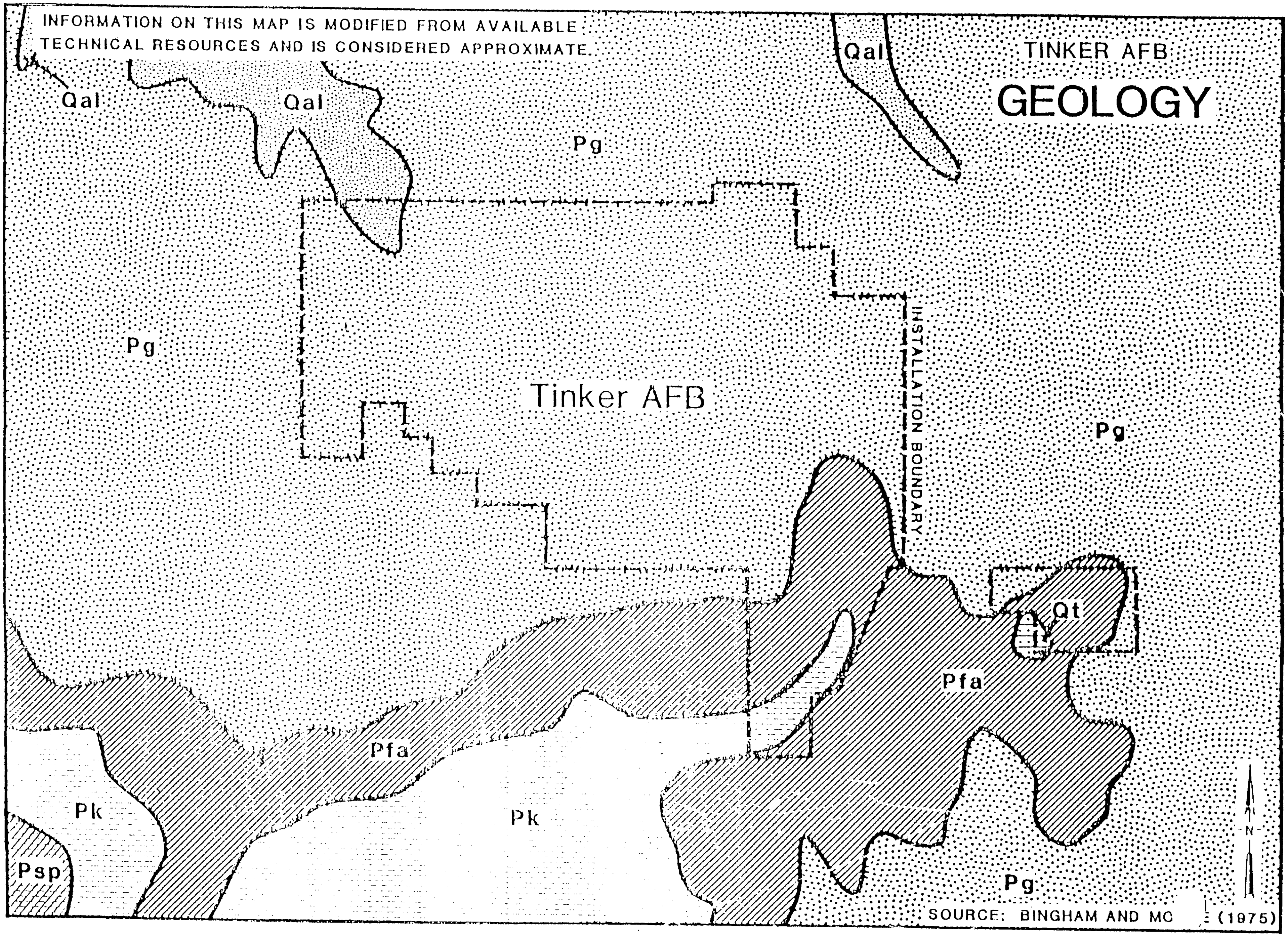
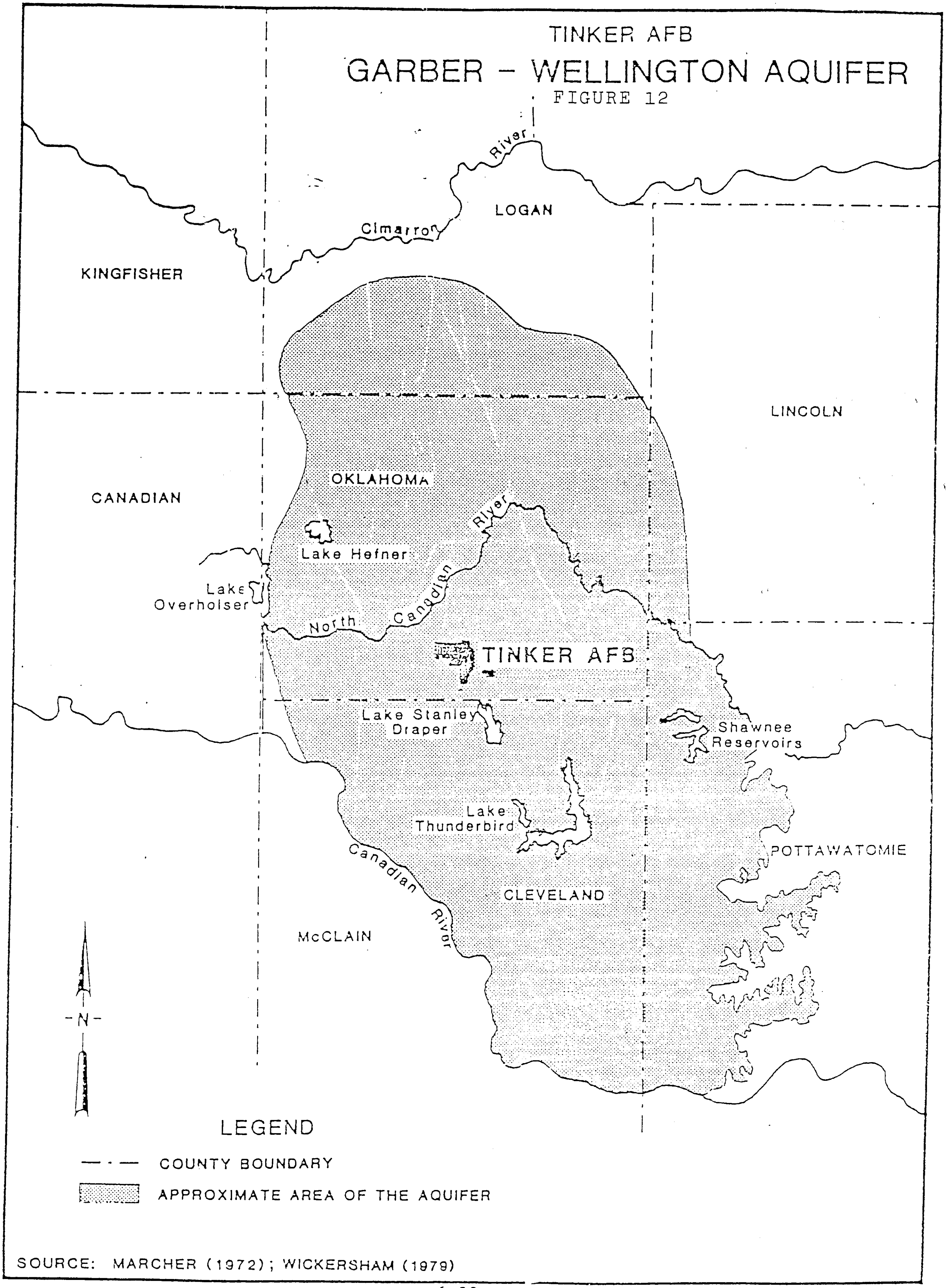
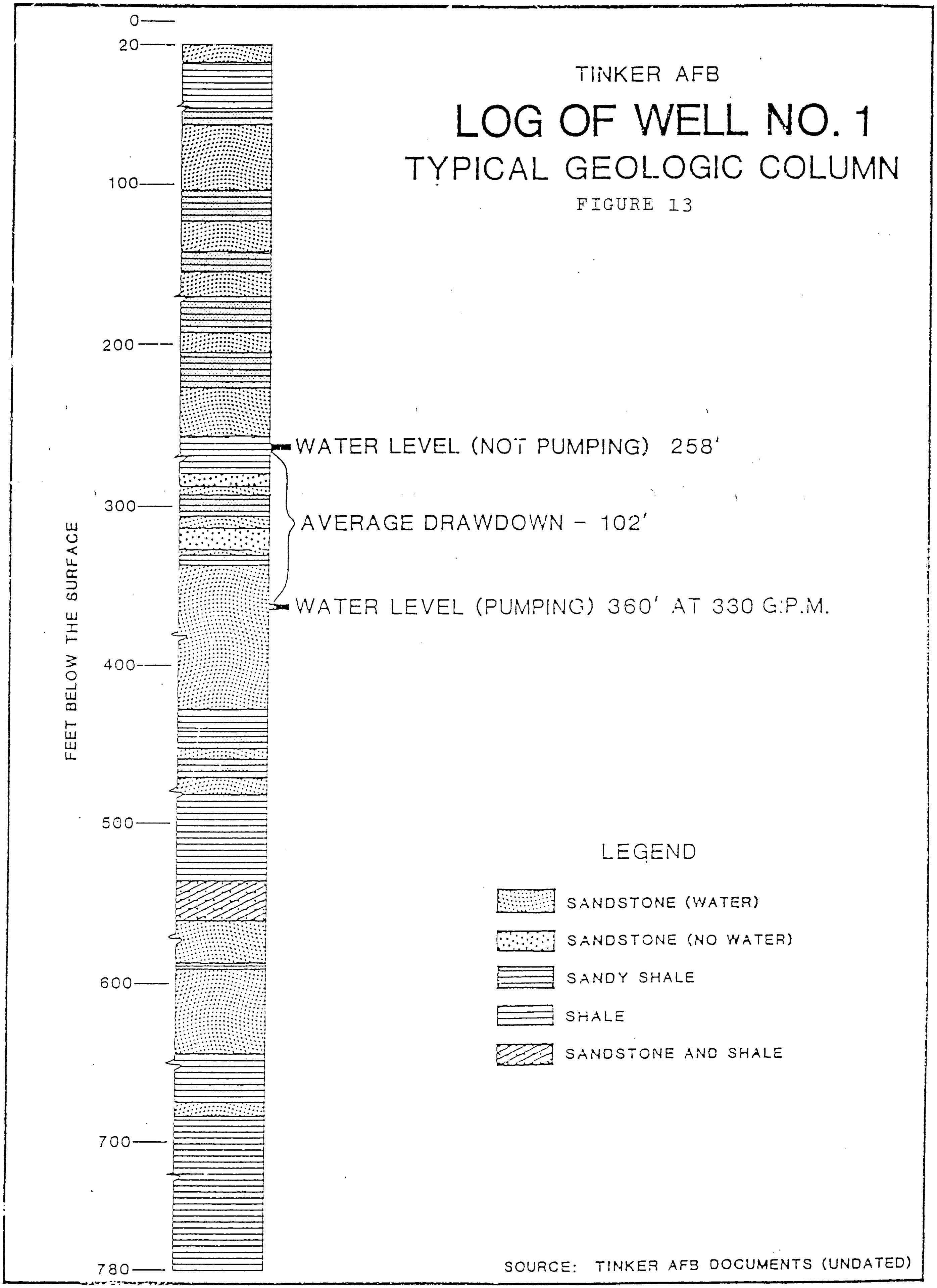


Figure 11: Geologic Map of Tinker AFB (See Table 4 for description of geologic units.)


TINKER AFB
GARBER - WELLINGTON AQUIFER
FIGURE 12
Cimarron River
LOGAN
KINGFISHER
LINCOLN
OKLAHOMA
CANADIAN
Lake Hefner
North Canadian River
Lake Overholser
TINKER AFB
Lake Stanley Draper
Shawnee Reservoirs
Lake Thunderbird
POTTAWATOMIE
Canadian River
CLEVELAND
McCLAIN
N
LEGEND
COUNTY BOUNDARY
APPROXIMATE AREA OF THE AQUIFER
SOURCE: MARCHER (1972); WICKERSHAM (1979)


TINKER AFB
LOG OF WELL NO. 1
TYPICAL GEOLOGIC COLUMN
FIGURE 13
FEET BELOW THE SURFACE
0
20
100
200
300
400
500
600
700
780
WATER LEVEL (NOT PUMPING) 258'
AVERAGE DRAWDOWN - 102'
WATER LEVEL (PUMPING) 360' AT 330 G.P.M.
LEGEND
SANDSTONE (WATER)
SANDSTONE (NO WATER)
SANDY SHALE
SHALE
SANDSTONE AND SHALE
SOURCE: TINKER AFB DOCUMENTS (UNDATED)

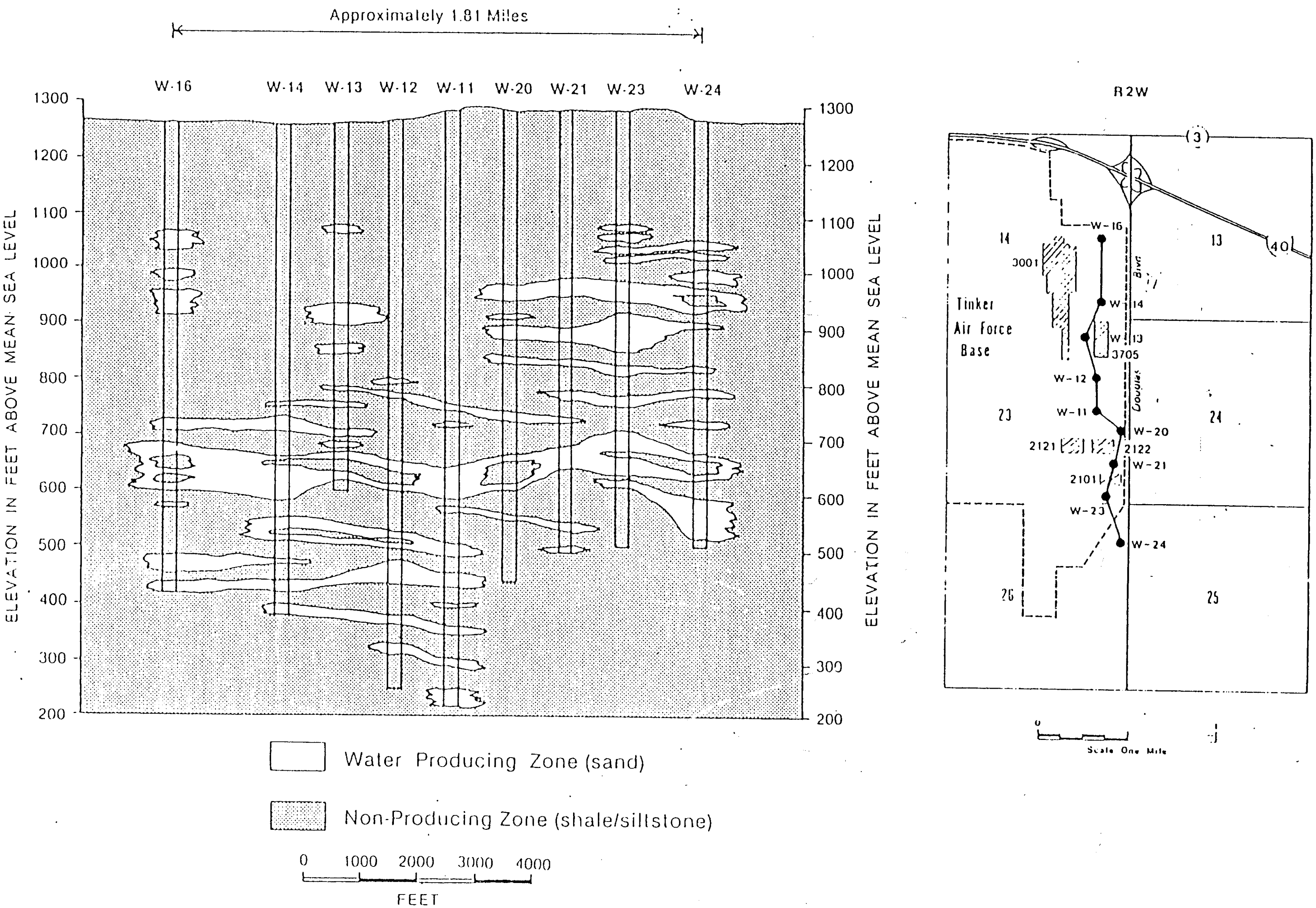


Figure 14: Geologic Section of the Garber-Wellington Aquifer at Tinker AFB (from Wickersham, 1979).

TINKER AFB

GROUND-WATER LEVELS AND FLOW DIRECTIONS

FIGURE 15

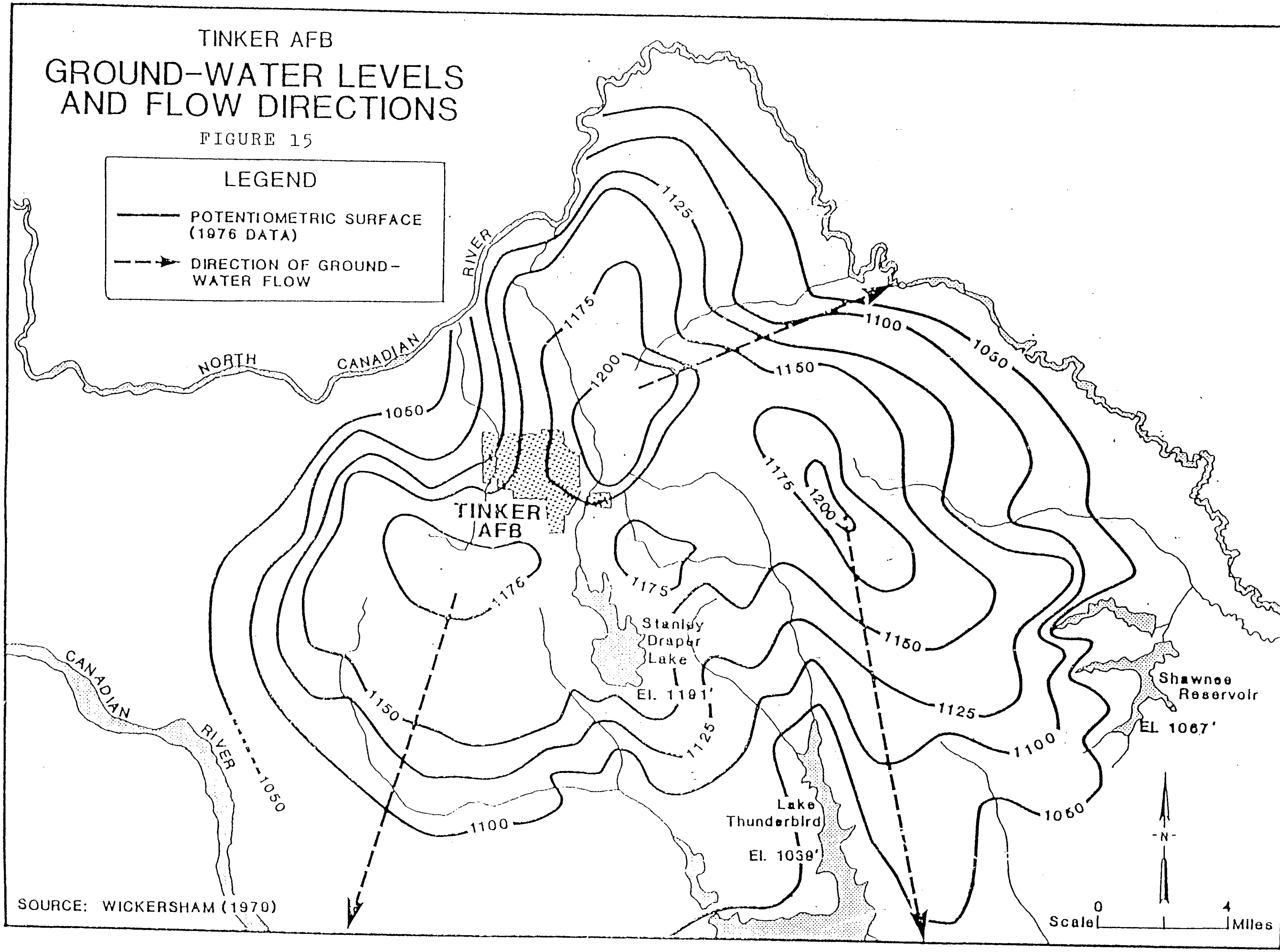


Table 1: References of Environmental Studies

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TABLE 2

TINKER AIR FORCE BASE SOIL ASSOCIATIONS

Symbol	Name	Description	Thickness in.	Unified Class.	Permeability in/hr*
1	Darrell-Stephenville: loamy soils of wooded uplands.	Sandy loam. Sandy clay loam. Soft sandstone. (Garber Sandstone)	12 - 54	SM, ML, SC	2.0 - 6.30
2	Renfrow-Vernon-Bethany: loamy and clayey soils on prairie uplands.	Silt loam - clay. Clay loam. Shale. (Fairmont Shale)	12 - 60	ML, CL MH, CH	<0.06 - 0.20
3	Dale-Canadian-Port: loamy soils on low benches near large streams.	Fine sandy loam. Silty clay loam. Loam. Clay loam	12 - 60	SM, ML CL	0.05 - 6.30

Source: USDA, SCS (1969).

* Although this characteristic of base soils is called "Permeability" by the Soil Conservation Service, it is actually a description of infiltration rates - the speed that water moves through unsaturated earth materials.

Note: See Figure 10 for soil Distribution.

TABLE 3

MAJOR GEOLOGIC UNITS OF OKLAHOMA COUNTY

System	Series	Stratigraphic Unit	Thickness (feet)	Description and Distribution	Water-bearing Properties
QUATERNARY	RECENT	Dune sand	0-20	Fine-to coarse-grained wind-blown sand. Consists chiefly of subrounded quartz grains. Forms a thin mantle or hummocky surface that obscures older rocks. Most extensive deposits on north side of North Canadian River near Lake Overholser.	Moderately to highly permeable, but mostly above the water table and saturated only locally. Where saturated, yields water readily to domestic or stock wells, but supply may not be permanent. Water most likely to occur in this unit where underlain by poorly permeable redbeds. Provides infiltration areas for recharge to underlying rocks.
	PLEISTOCENE AND RECENT	Alluvium	0-70	Unconsolidated and interfingering lenses of sand, silt, clay, and gravel in the flood plains and channels of streams.	Moderately permeable. Yields small to moderate quantities of water to wells in valleys of larger streams. Water is very hard, but suitable for most uses, unless contaminated by industrial wastes or oil-field brines.
		Terrace deposits	0-100	Unconsolidated and interfingering lenses of sand, silt, gravel, and clay that occur at one or more levels above the flood plains of the principal streams.	Moderately permeable. Locally above the water table and not saturated. Where deposits have sufficient saturated thickness, they are capable of yielding moderate quantities of water to wells. Water is moderately hard to very hard, but less mineralized than water in other aquifers. Suitable for most uses unless contaminated by oil field brines.
PERMIAN	LOWER PERMIAN	Chickasha Formation and Duncan Sandstone	200 ±	Beds of reddish-brown sandstone, siltstone, shale, and siltstone conglomerate. Individual beds of sandstone highly cross-bedded and well cemented, in western part of area between Canadian and North Canadian Rivers.	Poorly permeable. Tapped by only a few small-capacity wells for domestic or stock use. Water is hard and in places highly mineralized.
		Hennessey Group (Includes Kingman Siltstone and Fairmont Shale)	700	Deep-red clay shale containing thin beds of red sandstone and white or greenish bands of sandy or limy shale. Forms relatively flat to gently rolling grass-covered prairies.	Poorly permeable. Yields meager quantities of very hard, moderately to highly mineralized water to shallow domestic and stock wells. In places water contains large amounts of sulfate.
		Garber Sandstone	500 ±	Deep-red to reddish-orange, massive and cross-bedded fine-grained sandstone interbedded with and interfingered with red shale and siltstone.	Poorly to moderately permeable. Important source of ground water in Cleveland and Oklahoma Counties. Yields small to moderate quantities of water to deep wells; heavily pumped for industrial and municipal uses in the Norman and Midwest City areas. Water from shallow wells hard to very hard; water from deep wells moderately hard to soft. Lower part contains water too salty for domestic and most industrial uses.
		Wellington Formation	500 ±	Deep-red to reddish-orange massive and cross-bedded fine-grained sandstone irregularly interbedded with red, purple, maroon, and gray shale. Base of formation not exposed in the area.	

Source: Modified from Wood and Burton, 1968

TABLE 4

TINKER AIR FORCE BASE GEOLOGIC UNITS (PERMIAN)

Map Symbol	Unit	Lithology	Thickness, ft.	Structure	Geomorphic Features	Remarks
Qal	Alluvium	Sand, silt, clay, gravel	5-100	varied	Floodplains, low areas near streams	Local aquifer
Qt	Terrace Deposits	Sand, silt, clay, gravel	10-100	varied	Upland areas, benches near streams	Local aquifer
Psp	Salt Plains	Blocky shale and siltstone	200	flat-lying	Not exposed	Aquiclude
Pk	Kingman	Even-bedded siltstones; some sandstone and shale	30	flat-lying	Gently rolling plains	Aquitard
Pfa	Fairmont	Blocky shale; thin sandstone interbeds	30	flat-lying	Gently rolling plains	Aquitard
Pg	Garber	Fine-grained sandstone; shale, chert and mudstone conglomerate	150-400	flat-lying	Gently rolling and broad flat plains	Major regional aquifer

Note: See Figure 11 for geologic map of these units.

TABLE 5

SUMMARY OF
WEATHER DATA AT TINKER AFB, OK

MONTH	TEMPERATURE (°F) MEAN DAILY MAX	TEMPERATURE (°F) MEAN DAILY MIN	TEMPERATURE (°F) MEAN MONTHLY	TEMPERATURE (°F) EXTREME MAX	TEMPERATURE (°F) EXTREME MIN	PRECIPITATION (IN) MONTHLY MEAN	PRECIPITATION (IN) MONTHLY MAX	PRECIPITATION (IN) MONTHLY MIN	PRECIPITATION (IN) MAX 24 HRS	SNOWFALL (IN) MONTHLY MEAN	SNOWFALL (IN) MONTHLY MAX	SNOWFALL (IN) MAX 24 HRS	SURFACE WINDS PREVAILING DIRECTION (16 PT)	SURFACE WINDS MEAN SPEED (KT)
JAN	47	28	37	80	-7	1.2	6.1	I	2.2	4	25	6	S	11
FEB	52	32	42	85	-1	1.3	2.8	I	1.7	2	8	5	S	11
MAR	59	38	49	90	-1	2.0	5.2	.1	1.8	2	10	9	S	13
APR	71	51	61	94	25	3.3	8.7	.7	2.9	I	1	1	S	13
MAY	78	59	69	98	35	5.6	11.4	.3	5.7	0	0	0	S	11
JUN	87	68	78	105	52	4.2	13.5	.4	5.1	0	0	0	S	12
JUL	92	72	82	107	53	3.3	8.2	.1	3.7	0	0	0	S	10
AUG	92	71	82	107	56	2.4	9.3	I	2.8	0	0	0	S	10
SEP	84	64	74	107	40	3.5	11.3	I	6.2	0	0	0	S	10
OCT	74	53	64	98	26	2.5	7.5	I	2.7	I	I	I	S	10
NOV	60	40	50	83	11	1.6	7.3	0	2.0	1	6	2	S	11
DEC	50	31	41	85	0	1.5	3.5	I	2.3	2	11	6	S	11
ANN	71	50	61	107	-7	32.4	13.5	.0	6.2	11	25	9	S	11

Base Elevation: 1,291 feet
Period of Record: 1942-1972
I: trace amount

SOURCE: 654th Base Weather Station

7.0 CURRENT MISSION

Tinker Air Force Base is a military installation owned and operated by the United States Air Force, a component of the Department of Defense. Its primary mission is the maintenance, repair, and modification of military aircraft. The central organization at Tinker AFB is the Oklahoma City Air Logistics Center which controls and directs that mission. Several other organizations are based at Tinker but they all depend upon the Air Logistics Center for custodial support.

7.1 OKLAHOMA CITY AIR LOGISTICS CENTER (OC-ALC)

The Oklahoma City Air Logistics Center (OC-ALC) at Tinker AFB, Oklahoma, is one of five Air Logistics Centers reporting directly to Headquarters, Air Force Materiel Command, Wright-Patterson Air Force Base, Ohio. The OC-ALC is organized into directorates that reflect the major products and services produced. It also serves as the custodian of Tinker AFB, providing day-to-day housekeeping services and materiel for all organizations domiciled there. See Figure 3: OC-ALC Organization Chart.

Product Directorates: The Aircraft, Propulsion, and Commodities Directorates contain the required management, maintenance, and procurement resources to support their assigned systems and are each discussed below.

Aircraft (LA): The Aircraft Directorate is the largest directorate, employing 3,453 people, and is the center manager for all phases of aircraft management, modification and repair. The directorate manages approximately 1,800 aircraft valued at more than $35 billion, and performs depot level maintenance on more than 116 aircraft annually.

Aircraft managed and maintained at OC-ALC include the B-2, B-52, E-3, and the multipurpose -135 series aircraft. The B-1B is modified and repaired. The center also manages all Contract Logistics Support (CLS) aircraft, which includes the C-9, -12, -18, -20, -21, -22, -23, -26, -27, -137 series aircraft; and E-4, E-9, KC-10, T-1A, T-41, T-43, VC-25, and Peace Agua Aircraft. The Aircraft Directorate also manages missiles systems including the AGM-69A (SRAM), AGM-86B (ALCM), AGM-129A (ACM), and AGM-84C, the Air Force's Harpoon Missile.

Propulsion (LP): The Propulsion Directorate employs more than 2,200 people who manage and maintain more than 17,900 engines for 11 commands. Engines managed by the directorate include the F101, F107, F108, F110, F112, F118, J33, J57, J75, J79, T58, T64, TF30, TF33, and TF41. In fiscal 1991 they overhauled more than 1,100 engines.

Commodities (LI): The Commodities Directorate employs about 2,500 people who manage more than 82,000 items valued at almost $5 billion. These items are used on virtually every type of Department of Defense aircraft, plus those of 49 foreign countries. This directorate is the exclusive Air Force technology repair facility for hydraulic-pneumatic transmissions, air-driven accessories, oxygen components, engine instruments, and automatic flight control instruments.

Service Directorates: In addition to the product directorates other directorates provide center-wide services such as financial management, environmental management, procurement policy, industrial plant maintenance and computer services. Most of these are more fully discussed below.

Distribution (DS): The Directorate of Distribution provides support to base activities, the Air Logistics Center, all tenant organizations located on Tinker AFB and Reserve/Guard organizations from surrounding areas. Other major responsibilities include materiel accounting and inventory control; management of tank farms to provide local and transient aircraft refueling; materiel inspection and identification and packing and corrosion control.

The directorate maintains strict control and accountability for more than 2,400 aircraft engines and more than 4,000 shipping devices. The directorate also operates Tinker's Air Freight Terminal which processes cargo for movement on Air Mobility Command, commercial, and Logistics Airlift aircraft. This terminal is the only inland Aerial Port of Embarkation in the United States with the Air Mobility Command operating direct flights to both Pacific and European theaters. During normal activities approximately 5,300 tons of inbound and outbound cargo are processed through the Air Freight Terminal monthly. Other times, for example during Operation Desert Storm, operations expanded from handling 11 flights to handling 30 flights in a 24 hour period.

Technology and Industrial Support (TI): The Technology and Industrial Support Directorate provides scientific, technical, and administrative support to the product directorates. In accomplishing their mission they provide a wide variety of support not only for the other directorates but for the entire Air Logistics Center.

TI's laboratories are capable of in-depth chemical, metallurgical, and precision dimensional analyses. They perform composite material testing, first article testing and failure analysis. TI supports the product directorates in the repair, installation and maintenance of more than 20,000 pieces of industrial plant equipment. They also manage the Precision Measurement Equipment Laboratory which calibrates, repairs, and certifies test equipment not only for this ALC but for a nine state region. The directorate is also responsible for the central management of the Air Force's worldwide Technical Order Distribution System.

654th Communications-Computer Systems Group (SC): The 654th Communications-Computer Systems Group is responsible for the management, acquisition, development, operation and maintenance of all communications and computer systems in support of Tinker AFB.

Communications support includes managing, operating and maintaining a large Base Communications Center, an AUTODIN Switching Center, and one of the largest base telephone systems in the Air Force. The group manages, operates and maintains three information processing centers 24 hours per day, seven days a week. The Tinker Regional Information Processing Center currently provides support to the base level functions of Tinker and Vance AFBs as well as unique processing of the Configuration Status Accounting System (CSAS) for the B-1 Bomber. Other bases will be added as resources allow.

Public Affairs (PA): The Public Affairs office is located in Building 3001. PA representatives are the official spokespersons for the base. Public Affairs is responsible for the publication of the "Tinker Take Off", the base's weekly newspaper which is distributed on base each Friday.

Personnel in the PA office respond to all media queries and requests for information. All media contact is to be cleared through PA.

654th Support Group (SPTG): The 654th Support Group provides services and support for Tinker as well as for tenant organizations and off-base activities. The Support Group commander exercises command jurisdiction over the base.

The divisions of the Support Group include: Base Information Management, Director of Operations, Base Plans, Chaplain, Base Morale, Welfare and Recreation, Vehicle Transportation, Services, Security Police, Civil Engineering, Family Support Center and Strategic Arms Reduction Treaty Office.

The Support Group manages contracts for off-base disposal of non-hazardous solid-waste from throughout the base, and operates a recycling program for such items as aluminum, plastic, glass, and paper.

Base Weather Station (DOW): The Base Weather Station is a division of the 654th Support Group and is located adjacent to the flight planning and dispatch section of Base Operations, Bldg. 240, Area A. The unit's mission is to provide meteorological support services to all units residing on or transiting Tinker AFB and to give specialized weather support during emergency or contingency operations and to maintain readiness for world-wide deployment.

Environmental Management (EM): The Directorate of Environmental Management serves as the focal point for managing all environmental problems of the past, present and future on Tinker AFB. During fiscal 1991 EM reorganized into four divisions: Restoration (EMR), Compliance (EMC), Pollution Prevention (EMV), and Programs (EMX).

The Restoration Division is responsible for the cleanup of contaminated sites on base. These sites include 34 Installation Restoration Program (IRP) sites and 23 Solid Waste Management Units (SWMUs).

EM's Compliance Division is tasked with the day to day compliance issues of the base. Some of these include stream monitoring, asbestos abatement, wastewater management, underground storage tank management, hazardous waste management, 24-hour spill response and SARA Title III (Community Right-to-Know).

The Pollution Prevention Division bears the responsibility for Tinker's Waste Minimization and Chemical Tracking. This division is the lead Air Force office for introducing new prototype technologies into industrial processes, as well as prototype technologies for accelerated cleanup of contaminated sites on base.

The Programs Division serves as the financial manager for all EM projects. It plans meetings, arranges tours, maintains a library and orders technical publications, and provides support for all personnel actions.

7.2 TENANT ORGANIZATIONS

Tinker AFB is host to several military organizations that report to other commands but are supported here by the Oklahoma City Air Logistics Center. Some of these are discussed below:

552nd Air Control Wing (ACW): On October 1, 1991, the 552nd Airborne Warning and Control Wing (AWAC) was redesignated as the 552nd Air Control Wing as its parent command, the Tactical Air Command (TAC), was absorbed into the new Air Combat Command

(ACC). It is the main operating unit for the U.S. Air Force's E-3 "Sentry" aircraft. With more than 3,200 people assigned to nine squadrons, the wing trains crews and provides maintenance, computer and logistics support for E-3 operations around the globe.

The E-3's radar and other sensors provide deep look surveillance, warning, interception control, and airborne battle management for a variety of humanitarian, tactical, strategic and special missions. The E-3 can detect both air and seaborne objects with a radar range exceeding 250 miles. The ACW mission includes early warning defense of the North American continent, anti-drug surveillance in support of the national counter-narcotics effort, and readiness for worldwide deployment to support theater and unified commanders. Frequent joint-service and multi-nation exercises keep the 552nd ACW ready. In fact, at any one time, nearly one-half of the Wing's aircraft are deployed outside the United States.

<u>3rd Combat Communications Group (CCG):</u> The 3rd Combat Communications Group is a dynamic 1,000 plus person mobile unit that is attached to the 552nd ACW. The group is completely mobile and equipped and manned for fast reaction to any part of the globe. Besides deploying throughout the United States, past deployments have sent them to all seven continents as well as to

islands in the Pacific, Atlantic, and Caribbean. This Air Force resource exists to support the worldwide communications requirements of tactical forces anywhere in the world.

507th Tactical Fighter Group (TFG): The 507th Tactical Fighter Group is one of more than 50 flying units in the Air Force Reserve. It reports to the 419th Tactical Fighter Wing, Hill AFB, Utah, and is part of Tenth Air Force located at Bergstrom AFB, Texas. As the only Air Force Reserve unit in Oklahoma, the 507th TFG's mission is to augment the active duty force should war or national emergency arise. During peacetime the unit trains reservists for worldwide deployment. Training includes mobility exercises and weekend training. Each year the entire unit is activated for two weeks to develop, practice, and refine those skills needed to perform their tactical and support mission: to stand ready to deploy, fight, and win. More than 1300 men and women are assigned to the unit. Most are reservists meeting one weekend each month, but about 250 are Air Reserve technicians who work full time training reservists.

L-62 Strategic Communications Wing (SCW): In addition to the above named Air Force organizations Tinker AFB also supports the Navy L-62 Strategic Communications Wing which is composed of two Fleet Air Reconnaissance Squadrons. The Wing includes approximately 1600 Navy personnel. It moved into new facilities in the summer of 1992, and will become fully operational in 1993.

The mission of this Navy unit is to provide secure, survivable, jam-resistant, strategic communications relay for fleet ballistics missile submarines. The platform for the communications relay system is the E-6A Hermes strategic communications aircraft. It will support the National Command Authority by providing a vital communications link to submerged fleet ballistic missile submarines. Very low frequency (VLF) radio signals are used because of the ability of these signals to penetrate seawater, making it unnecessary for submarines to surface to receive messages.

The E-6A Hermes aircraft is a modified Boeing 707/C-137/E-3 airframe in which the communications gear is installed, including the 30,000 foot trailing wire antenna. Tinker AFB was selected to serve as the main operating base for the two Navy E-6A squadrons, which had been based on opposite coasts, because of the mid-continent location. This results in collocation with the Air Force depot maintenance activity, and supply operations for the C-137 and E-3 aircraft and the CFM/F-108 engine.

Defense Reutilization and Marketing Office (DRMO): Another non-Air Force organization hosted by Tinker AFB is the Defense

Reutilization and Marketing Office, a service organization of the Defense Logistics Agency (DLA). The DRMO provides property Disposal Services to Tinker AFB, other military commands and other Federal agencies within this geographic area. Disposal services include the inspection, receipt and storage of excess, surplus and scrap government property. The DRMO provides aggressive support to all generators of hazardous materials/waste in the receipt, storage, contracting, sale and ultimate disposal.

The DRMO is the Department of Defense focal point for the operational aspects of the DOD Precious Metals Recovery Program. This includes receipt, storage, breakdown, classification and shipment to reclamation sites. The DRMO receives and handles thousands of items yearly. Examples include aircraft parts, electronics, vehicles, vehicular parts, office equipment, furniture, hardware, tools and clothing. The DRMO also conducts sales of surplus government property.

8.0 WASTE MANAGEMENT

8.1 HAZARDOUS WASTE GENERATION

The primary mission of Tinker AFB has always been the maintenance, repair, and modification of military aircraft and associated equipment. The types of waste generated have changed little over the years while quantities vary with mission load. The largest waste streams are associated with surface preparation of aircraft parts. These include surface cleaning, paint removal and application, electroplating operations, and a sludge produced by treatment of wastewater from all the above operations. A large amount of used oil and out-of-specification aircraft fuel is produced in the maintenance operations. Much of this is shipped off-base for recycling or sold for energy recovery. Some of the fuel is burned on-site at the jet engine test facility. Coolant oil, normally non-hazardous, is recycled and reused on-site unless solvent or metal contamination occurs in which case it is shipped for off-site recycling.

In recent years clean-up of past contaminated sites has resulted in the generation of large amounts of contaminated soil and debris. Much of this is hydrocarbon contamination from underground storage tanks but some is heavy metal or solvent contamination from old surface impoundments or leaking process tanks. Elimination of polychlorinated biphenyls is nearing completion at Tinker AFB. The last large transformer was removed from service in 1990. Some PCB contaminated equipment and small capacitors continue to be found on the base. A project to remove all PCB fluorescent light ballasts has recently begun.

Several waste minimization initiatives have been put into operation. These include the banning of trichloroethylene solvent after it was identified in the contamination plume under Building 3001, a Superfund site. Lead and organic based paints have been replaced by water based or polyurethane paints for most applications. A dry impact laser beam plating technique has replaced some of the electroplating operations based on toxic cyanide solutions. Most paint removal from small parts is now done by carbon dioxide pellet blasting. Freon and other halogenated refrigerants are being phased out.

Periods of increased military activity such as World War II, the Korean War, Vietnam, and the Persian Gulf have been associated with increased hazardous waste generation at Tinker AFB. The military buildup of the 1980s, however, also resulted in high waste generation quantities. This was due in part to new responsibilities being assigned to Tinker, such as the B-1 Bomber, and the Airborne Warning and Control (AWAC) aircraft.

More recently, in spite of overall military downsizing, high waste generation has continued at Tinker AFB through consolidation here of operations from other places. Typical of this trend is the transfer of stealth aircraft (B-2, F-118) maintenance to Tinker and the arrival of the Navy Strategic Communications Wing.

Generation of hazardous waste occurs throughout the Tinker AFB industrial complex, however, certain buildings contribute much more than average. First among these is Building 3001, a one-mile long structure in the northeast part of the base that was constructed during World War II as a McDonell-Douglas aircraft factory. It was absorbed into Tinker Field after The War and has remained as the primary maintenance and repair facility. Nearly all generation processes occur there including electroplating, chemical and abrasive cleaning, machining of parts, maintenance, and paint application. Building 3221 is also the location of large chemical cleaning and parts machining operations. Buildings 2121, 2122, and 2280 are the primary locations for paint removal and application. These maintenance hangers are also the source of much waste oil, solvents, and out-of-specification aircraft fuel. The majority of ground vehicle maintenance is performed at Buildings 2101 and 2110, making them large generators of used oil, hydraulic fluid, and solvents. The Industrial Wastewater Treatment Plant (IWTP) at the far northeast corner of the base treats wastewaters from throughout the base. It is the source of the largest single waste stream at Tinker AFB, a sludge containing heavy metals such as chromium and cadmium derived from electroplating operations.

Table 6: 1991 Waste Generation at Tinker AFB, summarizes waste generation by grouping generation processes into broad categories and listing the locations and types of waste produced. The quantities listed are based upon 1991 records.

8.2 HAZARDOUS WASTE TREATMENT

Except for a short-lived operation in closed tanks, and a closed-loop pretreatment system as discussed below, treatment of hazardous waste does not occur at Tinker AFB. Treatment of wastewaters in accordance with Clean Water Act does take place and where possible out-of-specifications products, such as aircraft fuel, are used for other purposes. The largest treatment operations occur at the wastewater treatment plants near the northeast corner of the base. An Industrial plant (IWTP) and a Sanitary plant (SWTP) are situated side-by-side at that location. Not included in this discussion are those used oils and waste fuels that are shipped off-site for recycling or energy recovery. As discussed in "Hazardous Waste Generation" these items totaled 1,216,333 pounds in 1991.

Wastewater Treatment: Treatment of industrial liquid waste streams began in 1963 and has always been located in the northeast corner of the base near Gate 19. The treatment facility discharges treated wastewater to Soldier Creek in accordance with Tinker's NPDES permit. The waste facilities were originally designed to treat approximately 290,000 gallons per day of primarily waste electroplating solutions. In 1969 additional industrial sewer lines were installed to collect dilute streams of electroplating, cleaning, and other maintenance area waste streams for treatment. Major improvements in the treatment system were completed in 1971 which increased the design capacity to 1.5 million gallons per day. Extensive additional improvements have been made in the last two years designed to improve the quality of effluent from the plant. The capacity of the plant has not changed but the influent stream has actually decreased in recent years. That stream will continue to decrease as chemical cleaning shops in Buildings 3001 and 3221 install new processes that eliminate much of their waste. Since 1979 all sludge from the IWTP has been disposed of off-base by a contract service in bulk form by tanker trucks. Prior to that time some of the sludge was disposed of in base landfills or waste pits.

Domestic sewage has been treated on-base since 1942 by both an activated sludge system, and by a single stage trickling filter system. The activated sludge system served the north central and west base areas until the early 1970's. This system discharged treated effluent into a tributary to Crutcho Creek. This system was located on Patrol Road at Reserve Road and, since closure of the plant, the sludge drying beds have been used for storage of drummed hazardous waste. This sewage treatment system may have received infrequent batches of oil and grease for treatment from the aircraft maintenance areas located in the north central base area. Domestic sewage from the north central and west base areas presently are connected to the Oklahoma City sanitary sewer system.

The single stage trickling filter treatment facility is located adjacent to the industrial waste treatment facility. This system treats domestic sewage from the east base area. The design capacity of the plant is 0.9 million gallons per day, however, normal discharge flow is estimated to be 60 percent of design flow. This facility treated quantities of industrial waste streams from the early 1960's to the early 1970's prior to and during the expansion of the IWTP.

<u>Non Wastewater Treatment:</u> For many years small amounts of out-of-specification aircraft fuel have been burned in the jet

engine test facility as a supplement to new fuel. In the late 1980's an experimental solvent recovery operation for calibration fluid and PD-680 in tanks was conducted at Building 3125. The experiment was soon terminated, however, both for regulatory considerations and because the design did not produce satisfactory results. One outgrowth of that experiment, however, is an ongoing operation to recover used coolant oil at the same location. This oil does not normally meet the definition of hazardous waste, but a sludge that collects in the unit sometimes contains high metal content or traces of solvents. The sludge is routinely collected and transported as hazardous waste. At the plating shop in Building 3001 a closed-loop pretreatment operation reduces heavy metal content of process liquids and reintroduces them to the process. When the process liquids are eventually released to the Industrial Wastewater Treatment Plant the concentration of these metals (Cadmium, Chromium) is much less than it would otherwise be. A dry sludge resulting from this pretreatment operation is collected and shipped off-site as a hazardous waste.

8.3 HAZARDOUS WASTE STORAGE

This discussion will include all methods of holding waste prior to its being treated, transported, or disposed. Little is known about procedures for storage of waste prior to 1980. Upon promulgation of RCRA regulations proper procedures and facilities were established.

Accumulation Sites: While the number and location of these sites are very fluid parameters, at the time of last accounting (May 1992) there were 109 locations where initial accumulation of hazardous wastes took place in accordance with the "55-gallon rule", 40 CFR 262.34(c)(1). At Tinker these sites are referred to as "Satellite Accumulation Points" (SAPs). In the same accounting list there were 10 sites operating in accordance with the "90-day" rule, 40 CFR 262.34(a). At Tinker these are known as "Temporary Storage Sites" (TSSs). Table 7: Hazardous Waste Storage Sites, is a copy of that latest accounting which includes location, waste type, and generating unit. The TSS's at Buildings 3125 and 1005 are operated by the Environmental Management Directorate and are the central base receiving locations for drummed hazardous wastes from throughout the base. The drums are prepared for transport here and then transferred to the permitted storage facility operated by DRMO (Buildings 3728 and 3770). A discussion of accumulation sites is presented elsewhere in this document at Part C, Section II (New Investigations).

RCRA Permitted Sites: Two buildings (3728, 3770) located in a fenced area near the east edge of the base are permitted for long term storage of hazardous wastes. A permit to operate these facilities was first obtained in 1984. In 1989 a new application was submitted to include provisions for the Hazardous and Solid Waste Amendments to RCRA of 1984. This permit was approved on July 1, 1991. This facility is operated by the Defense Reutilization and Marketing Office (DRMO). Through a contract managed by DRMO nearly all wastes collected in 55-gallon drums at Tinker AFB are stored at this location until contractual logistics allow for shipment to treatment or disposal facilities.

8.4 HAZARDOUS WASTE DISPOSAL

During the early years of Tinker AFB history much waste was disposed of on-site in a variety of surface impoundments and landfills, and by dumping into storm sewers, land surfaces, and into water bodies. Figure 17: Location of RFI SWMU's, depicts the location of many of those disposal sites. By 1979, however, on-site disposal had been terminated and dumping of any kind had been prohibited by base policy. Since that time off-site disposal by contract services has been the normal mode of operation.

Landfills: Between 1942 and 1979 wastes of various kinds were disposed of on-site in a series of six landfills. Table 8:

Summary of Landfills at Tinker AFB, outlines the dates of operation, waste types, and quantities disposed for all six landfills.

Waste Pits: Between 1947 and 1965 industrial wastes were disposed in unlined pits near the east side of the base. Waste Pit #1 located southeast of Building 2121 was operated between 1947 and 1958. Interviews with base personnel indicated that plating and maintenance wastes including oils, fuels, chromates, phenols, cyanides, acids, and bases were disposed of here. Waste Pit #2 near the southeast corner of the base operated from 1958 to 1965. It reportedly received wastes similar to Waste Pit #1. After the Industrial Wastewater Treatment Plant became operational in 1963 there was less need for these pits.

Radioactive Waste Disposal Sites: Four sites at Tinker AFB have been identified as disposal locations for low-level radioactive waste. Disposal activity took place during the 1950's and consisted of burying such low-level radioactive wastes as radium paint, instrument panels, and thorium enhanced metal airplane parts. Table 9: Summary of Radioactive Waste Disposal Sites, outlines pertinent information about these sites.

Fire Training Areas: Between 1950 and 1980 three sites on Tinker AFB have been used to simulate aircraft fires for training purposes by burning waste fuel, and sometimes other liquid wastes, in a pit on the ground. FTA #1 west of Patrol Road and just north of Crutcho Creek operated between 1950 and 1962. The pit was unlined and the burning probably included waste solvents and oils. Water was reportedly used first to saturate the ground and minimize infiltration. FTA #2 located in the south central part of the base operated from 1962 to 1966. It was also unlined but the practice of burning drummed wastes was reportedly terminated at this time. FTA #3 located just east of FTA #2 operated from 1966 to 1980. About 600 gallons of aircraft fuel were used during each exercise which took place at intervals ranging from once per month to two times per year.

Ordnance Disposal Facility: Ordnance disposal was conducted on base between the early 1960's and 1972 at a location near the southeast corner of the base and just east of Waste Pit #2. The ordnance disposed consisted of small arms munitions, blasting caps, flares, pyrotechnics, and egress items. The operation took place less than once per month. All ordnance disposal now takes place off-site.

Storm Sewers: Evidence that liquid waste disposal took place through storm sewers during early years at the base was obtained through a report prepared by the USAF Occupational and

Environmental Health Laboratory in 1980. This report was based on water samples taken from storm sewers in the vicinity of Buildings 3001, 3102, 3105, 3108, 3705, and 3703. High levels of phenols, chromium, and zinc were discovered. The actual source of these contaminants was not determined.

8.5 SPILL MANAGEMENT

Various Federal and State regulatory agencies, as well as the Air Force itself, require that a formal plan be prepared and implemented to respond to spills of hazardous chemicals, petroleum products, and other hazardous substances. At Tinker AFB such a plan is outlined in "OC-ALC Plan 19-2, Spill Prevention and Response Plan". This publication lists procedures for spill reporting and outlines responsibilities for spill response. The following phased procedure taken from that publication explains how a typical spill would be managed at Tinker AFB:

Oil and Hazardous Substance Contingency Plan

> Due to the diversity of materials stored on base and the variable severity of the hazards presented in the event of a spill, the response actions will vary. General procedures are outlined in the following

sub-sections. These procedures should be reviewed and if necessary, updated prior to adopting courses of action in a particular situation. The table in Appendix 1 to Annex C and maps in Appendix 10 to Annex C (not included in this document) should be consulted with regard to the reportable spill quantities, probable spill routes and contingency actions. If a Site-Specific Contingency Plan exists for the spill area in question, E-13 will appear in the Contingency Action column of the Appendix 1 to Annex C table and the site specific plan should be referred to in Appendix 4 to Annex C (not included in this document). It should be noted that this plan deals primarily with releases of solid and liquid phase pollutants. However, releases of solid, liquid, and gaseous substances which are declared Major Accidents should be dealt with in accordance with Tinker AFB OPLAN 355-1, Disaster Preparedness.

In general, response to a pollution spill at Tinker AFB will be according to a five phase program. Phase I designates the initial spill response procedures to be followed by any individual discovering a spill or potential spill of oil or hazardous substances. It also designates the procedures to be followed by the

Fire Department, Base Civil Engineer and CE Service Call Desk in providing rapid notification of the spill to the proper on-base personnel and organizations. Phase II then designates the general response actions to be taken by the on-scene coordinator (OSC) in the containment and cleanup of the spill site. Phase III describes short term restoration and long term restoration activities necessary to restore the spill site. Phase IV pertains to recovery of damages and enforcement. Phase V describes training to be conducted.

(a) Phase I - Spill Discovery and Initial Notification: This phase covers actions taken to discover, locate, characterize and report the spill.

1. Any person recognizing an oil, hazardous substance, or hazardous waste spill shall immediately:

a. Activate emergency alarm system, if any.

b. Evacuate the area, if warranted by the type of spill.

c. Make sure that all employees shut down their operations and secure their equipment.

d. Call the fire department (2854 CES/DEF), on-base, ext. 117, off-base, telephone no. 737-1117, and give the type, location, size of spill and name of the individual reporting.

e. Inform the supervisor, Section Foreman, or Chief.

f. Contain the spill, if it can be done safely.

g. Perform cleanup operations within the unit's capabilities and assist the fire department upon its arrival.

h. Ensure that an employee roll call is conducted to discover whether any personnel are trapped in the affected area.

i. Any person or agency may give formal notification of a pollution spill or a potential spill at Tinker AFB by writing a letter to the 2854 CES/DE. The OSC will then take action and make formal reports and notifications to Oklahoma City ALC/CC and 2854 ABG/CC.

2. The Fire Department (2854 CES/DEF) will notify:

a. The Tinker Consolidated Command Post (TCCP) who will notify the Base Commander (2854 ABG/CC) and the MAB Aircraft Control Center.

b. The Base Civil Engineer (2854 CES/DE).

c. Civil Engineering Service Call Branch (2854 CES/DEMRS), ext. 43117.

d. Base Operations (2854 ABG/OTM) if spill is within airfield confines as defined in OC-ALC TAFBR 60-1.

e. Security Police (2854 SPS).

f. If necessary, USAF Hosp/Emergency Room.

3. Civil Engineering Service Call (2854 CES/DEMRS) will notify:

a. Chief, Operations Branch (2854 CES/DEM).

b. Water and Waste Unit (2854 CES/DEMSW).

c. Environmental Management (OC-ALC/EM).

d. Safety Office (OC-ALC/SE).

e. Bioenvironmental Engineering (USAF Hosp/SGB).

f. Civil Engineering Squadron Duty Officer.

g. Staff Judge Advocate (OC-ALC/JA), ext. 95811

(b) Phase II - Spill Response Actions

1. In the event of a spill of oil or hazardous substances, the OSC will be responsible for directing and coordinating all spill response actions. The Fire Department will maintain a computer log detailing all actions taken during the course of the pollution spill response. A printout of this spill report will be provided to OC-ALC/EMC. Spill response actions which are under the responsibility of the OSC are:

a. Activate or authorize action of appropriate members of the Spill Response Team (SRT) based on information relayed during initial notification or information provided by OC-ALC/EM, and immediately investigate the reported spill. Notify the Tinker Consolidated Command Post and remain in contact with the Consolidated Command Post for submitting JOPREP/JIFFY OPREP-3 Reports.

b. Determine the source, type and approximate quantity of spilled substance.

c. Direct Environmental Management to take samples to determine the chemical nature, pollutant concentration and extent of the spill as required for response actions and documentation. Water and pollutant sampling should be performed according to the procedure shown in Appendix 12 to Annex C (not included in this document).

d. Evaluate magnitude and severity of the threat to public health, welfare and natural resources. Material Safety Data Sheets should be utilized as required to determine potential health, air, and pollution effects associated with the spilled material.

e. Take appropriate safety precautions to protect response personnel and any additional personnel located in close proximity to the probable spill route. Base Security Police will be utilized for implementing evacuation or traffic control measures.

f. Determine the party responsible for the spill, if other than the Air Force. The responsible party should be informed of the spill and their response action evaluated by the Base OSC. If their response actions are inadequate in the judgement of the OSC, they should first be informed of their financial liability, and then if their spill response actions remain inadequate, the Base OSC should assume control of the spill response. In all response actions involving parties other than the Air Force, the Base Judge Advocate should be informed. If a contractor is involved with a spill, the contracting office should be notified.

g. Determine the cause of the spill and institute appropriate action to stop the source of the spill if it is still occurring.

h. Initiate spill containment procedures. The primary concern is to confine spills as close to their source as practical and, if at all possible, prevent spills from leaving base property. In accomplishing this task, the OSC should refer to the following sources of information contained in this document:

1) Appendix 1 to Annex C (not included in this document) for maximum potential spill quantities, available secondary containment, probable spill routes and general contingency actions.

2) Appendix 4 to Annex C (not included in this document) for site-specific contingency plans when the existence of such a plan is stated under "Contingency Action" in Appendix 1 to Annex C.

3) Appendix 9 to Annex C (not included in this document) for maps to assist in the determination of probable spill routes, access to the spill sites, location of remote secondary containment and spill containment areas.

4) Appendix 6 to Annex C (not included in this document) for spill response equipment inventory and location of equipment.

5) Appendix 5 to Annex C (not included in this

document) for a listing of the oil/water separators located on base which may potentially be used for containment of spills.

i. Contact HQ AFLC/DEV by telecon (AUTOVON 787-5879), even if base personnel are uncertain of the spill classification. The purpose of the telecon is to verify the spill classification or aid in the classification when uncertainty exists and to gather available information on reportable spills to support the initial command telecon report to USAF/LEEV. For spills occurring after normal duty hours or on weekends, the HQ AFLC/DE alert duty officer should be contacted through the HQ AFLC Command Post (AUTOVON 787-6314). The information to be reported is found in Paragraph 6, AFR 19-8 and is shown below. All telephonic reports will be confirmed by message. Reports should not be delayed due to lack of items listed in the report format. Confirm that the base commander (2854 ABG/CC) has been notified prior to releasing this message.

1) Name of installation.

2) Incident report number (initial, second, third,

final, etc.).

3) Date/time of incident.

4) Severity of incident. Specify degree (serious or minor) of potential or actual threat to human life; to property (private, state, or Federal); to plant or animal life, etc.

5) Location of incident and the nature of the terrain at the location to include surface and subsurface drainage characteristics and relationships to water bodies (estimate extent of area affected such as miles of stream or acres of lake).

6) Cause of incident.

7) Type and estimated amount (barrels/gallons/lbs) of pollutant.

8) Damage impact on the surroundings, including fish and wildlife.

9) Corrective action to eliminate pollution source.

10) Corrective action taken to remove pollutant.

11) Assistance required.

12) Estimated completion date of remedial actions.

13) Anticipated or actual reaction by the news media and public to the incident. Specify potential for liability.

14) National Response Team, Environmental Protection Agency or US Coast Guard Office notifications.

15) Explain how Spill Prevention and Response Plan implemented.

j. Direct Environmental Management to determine if a reportable spill has occurred.

k. Advise Base Public Affairs of the size and nature of the spill, response actions and whether or not unfavorable publicity is expected.

l. Initiate clean-up actions. Pollutants will be collected to the maximum extent possible.

1) Petroleum pollutants will be collected and stored in the waste oil storage facility located near the Industrial Waste Treatment Plant (bldg. 62501AA).

2) Absorbent and similar material will be placed in 55 gallon drums, labeled, turned in to the Defense Reutilization and Marketing Office (DRMO) and stored there if necessary until eventual disposal in accordance with Department of Defense (DOD) and RCRA requirements.

3) Hazardous pollutants will be collected in polyethylene lined drums (see 49 CFR 178.133) or other approved drums under 49 CFR 172.101 or 102, labeled, turned in to DRMO and stored there if necessary until eventual disposal in accordance with DOD and RCRA regulations. The Chemical Hazards Response Information System (CHRIS) Hazardous Chemical Data Sheets and Material Safety Data Sheets should be consulted with regard to special procedures and precautions.

m. Verify contractor load tickets in the event that a contractor is used to clean-up a spill. The OSC shall verify the load the contractor removes and the ultimate destination of the load.

n. Officially classify oil spills using the following definitions:

1) Minor discharge: Minor discharge means a discharge to the inland waters of less than 1,000 gallons of oil; or a discharge to the coastal waters of less than 10,000 gallons of oil.

2) Medium discharge: Medium discharge means a discharge of 1,000 to 10,000 gallons of oil to the inland waters; or a discharge of 10,000 gallons to 100,000 gallons of oil to the coastal waters.

3) Major discharge: Major discharge means a discharge of more than 10,000 gallons of oil to the inland waters; or more than 100,000 gallons of oil to the coastal waters.

4) Reclassification of Minor Spills: A spill normally classified as minor, will be reclassified as medium or major depending upon the degree of impact, if it occurs in or endangers critical water areas; generates critical public concern; becomes the focus of an

enforcement action; or is a threat to the public health or welfare.

o. Direct Environmental Management to classify spills of hazardous substances as minor, medium, or major. Classification of these spills will take into consideration the amount and type of substance released and its potential impact on public health, welfare, and the environment.

p. Following the initial confirmation message, the base will release and transmit subsequent messages every weekday as of 0800 to HQ AFLC/DEV (with copy to HQ USAF/LEEV) and transmitted by 1000 same day. If there is no change to the previous day's report, no report is required.

q. On completion of clean-up operations a "close-up" report will be submitted to HQ AFLC/DEV, with information copy to HQ USAF/LEEV. This report must be submitted in letter format within 30 days to the Oklahoma Water Resources Board. In addition, the report must be submitted within 60 days of a "major" oil spill to the National Response Team and the Regional Response Team; within 60 days of a 1,000 gallon oil spill or two (2) reportable oil spills in twelve (12) months to the Regional Administrator of EPA; within 60 days of a reportable spill of Clean Water Act Section 311 substances to the Regional EPA Enforcement Division Director ; and within 15 days of a spill of hazardous waste requiring the implementation of the SPR Plan to the Regional Administrator of EPA. Both regulatory agency reports and internal Air Force reports should contain all of the information listed below. However, the regulatory agency reports must be in narrative format and the internal Air Force reports must be in the message format specified in AFR 19-8.

1) Name and address of installation and/or owner;

2) Name and telephone number of OSC;

3) Incident report (initial, second, third, final);

4) Date and time of incident;

5) Time of official spill notification to the National Response Center and other regional and state officials;

6) Location of incident and the nature of the terrain at the location, to include surface and subsurface drainage characteristics and relationships to water bodies (estimate extent of area affected such as miles of stream or acres of lake);

7) Weather conditions and how they affected response action;

8) Cause of incident;

9) Type and estimated amount (barrels, gallons, pounds) of pollutant and the official size classification (minor, medium, major);

10) Actual damage and/or potential threat to human life, to property (private, state, or Federal), and to plant or animal life;

11) Corrective action taken to eliminate pollution source;

12) Corrective action taken to remove pollutant;

13) Assistance required;

14) Estimated completion date of remedial actions and anticipated effectiveness;

15) Estimated quantity and disposition of spill material and contaminated soil;

16) Confirmation that emergency response equipment is back in operation before resuming operating activities;

17) Description of any problems encountered during implementation of the SPR Plan and an explanation of how the Spill Prevention and Response Plan was, or will be, modified to prevent the recurrence of the spill event;

18) Anticipated or actual reaction by the news media and public to the incident (specify potential for liability in the internal Air Force reports only);

19) A copy of this SPR Plan if requested.

r. Assess damage caused by the spill and initiate efforts to restore the environment to its prespill condition. This includes such actions as resodding areas damaged by a spill, restocking fish in affected streams, etc.

s. Ensure that emergency equipment is restored to full operational status by emergency crews.

t. The OSC, assisted by two other qualified persons from affected organizations, will investigate the cause of the emergency and take steps to prevent a recurrence of such or similar incidents.

u. Prepare Operations Event/Incident Report (RCS 1-HAF-V36) according to the following:

1) The OPREP-3 reporting system, covered by Volume 3 of the Joint Chiefs of Staff Publication 6, "US Air Force Reporting Instructions," will be used to report catastrophic polluting incidents such as major spills (a discharge of oil of more than 10,000 gallons in inland waters or more than 100,000 gallons in coastal waters) or a discharge of any quantity of material or substance that substantially threatens the public health or welfare or generates wide public interest.

2) Reporting under Rule 24 will be immediate

telephonic notification to HQ AFLC/DEV. If follow up teletype reports are required, HQ AFLC/DEV will advise.

(c) Phase III - Short-Term and Long-Term Site Restoration: This phase includes the activities necessary for short term and long term site restoration.

1. Short-term site restoration includes the removal of contaminated soil, clean-up of exposed surfaces, and any other immediate actions intended to permit workers to resume normal work activities near the spill site.

2. Long-term site restoration includes spill site restoration where hazardous chemicals have contaminated large quantities of earth or ground water, or where surface water is contaminated. These activities may require several years to complete. Long-term restoration actions will prevent further contamination, restore contaminated earth and water, and permit productive use of the spill site.

(d) Phase IV - Recovery of Damages and Enforcement:

This phase includes the recovery for damage done to Federal property and the collection of scientific and technical information.

1. Responsibilities:

a. Tinker Air Force Base is responsible for all recovery, cleanup and restoration costs for spills caused by the Base. If the cleanup is accomplished by another Federal agency, Tinker Air Force Base is responsible for reimbursing that agency.

b. For non-Air Force spills, where the Air Force furnishes assistance to the Regional Response Team (RRT), Tinker AFB would furnish assistance, providing mission capability is not degraded. Reimbursement for expenditures would be sought from the organization requesting the assistance. If spill response is in support of a spill of unknown origin, reimbursement may be requested from funds established for this purpose and managed by the United States Coast Guard (USCG).

2. All spills caused by contractors on Tinker AFB will be handled in accordance with the Policy on

Obtaining Reimbursement from Contractors for Environmental Costs, Appendix 10 (not included in this document).

3. Enforcement: The Department of the Air Force will refer any enforcement actions to the appropriate RRT for their determination of responsibility and requirement for legal actions.

4. Scientific and Technical Information: All data and samples collected during a spill response will be assembled by the OSC and made available to the scientific community or to the RRT for use in enforcement or legal actions.

(e) Phase V - Training: This phase includes training of spill response personnel.

1. The 2854 CES/DEM Chief will ensure the training of personnel who operate spill containment equipment such as defueling trucks, straw booms and earthmoving equipment. Personnel must also be instructed in the proper use of sample collection bottles.

2. All organizations will assure that personnel

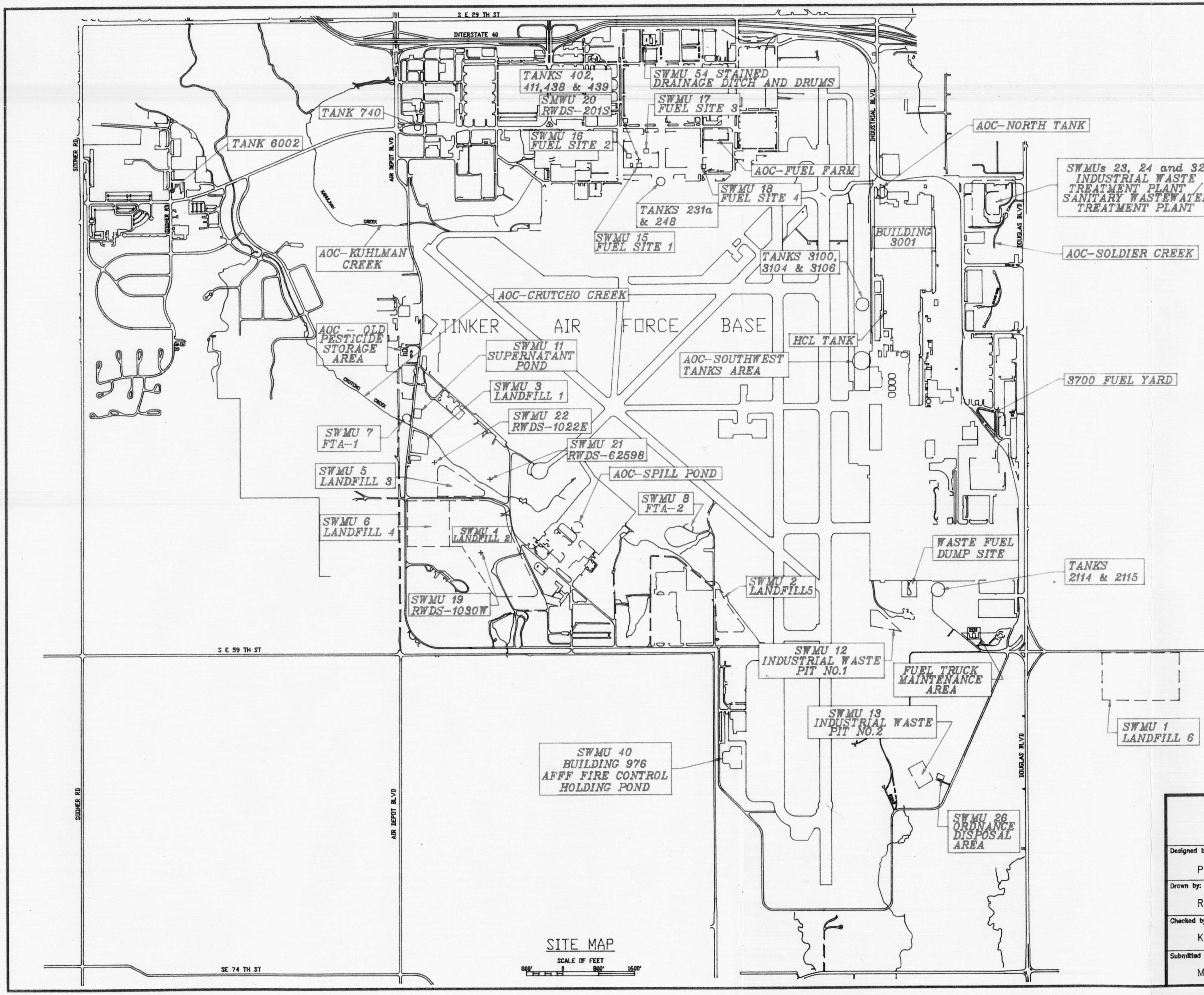
within storage areas of sections/units where there is a potential for chemical emergencies are aware of this plan and are prepared to act in accordance with this plan.

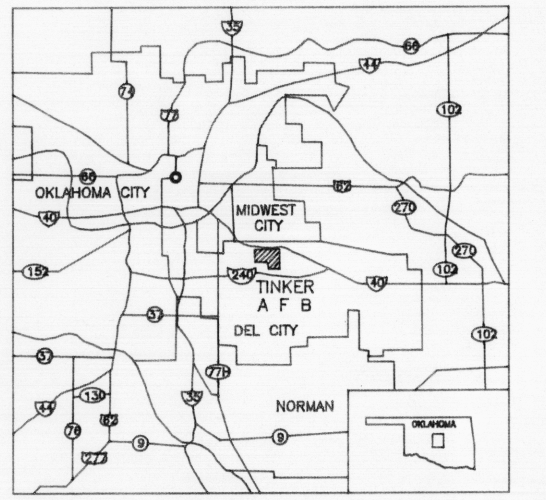
3. The OC-ALC/IG office will appoint an exercise team to be responsible for conducting a spill exercise at least semi-annually.

Incident Reports are kept on-file at the Directorate of Environmental Management. Appendix D: Reportable Spill Reports 1978-1992, contains copies of those reports completed since 1978 that describe spills which exceeded "Reportable Quantity" limits.

8.6 SOLID WASTE MANAGEMENT

From 1942 through 1979 nearly all household or municipal type waste, garbage, or refuse was disposed of in one of the six on-site landfills discussed above in paragraph 8.4. Starting in 1979, however, a contractor arranged for through the base civil engineer's office, has disposed of this type of waste at an off-site location. A program operated by the Morale, Welfare, and Recreation (MWR) Office, a component of the 654th Support Group presently recycles much of this material. Aluminum, glass, plastic, and paper are collected from throughout the base and sent to recycling centers. The proceeds are used to help finance recreational and other leisure time activities for base personnel.





VICINITY MAP

	TINKER AIR FORCE BAS OKLAHOMA CITY, OKLAHOMA
Designed by: P.F.D. Drawn by: R.S.	LOCATION OF RFI SWMUs
Checked by: K.V. Submitted by: M.L.M.	Scale: AS SHOWN / Project No.: 7902-025 Dwg. No.: FIG1.DWG / Date: 12/91

Table 6 1991 Waste Generation at Tinker AFB

Process	Location Building #	Waste Streams	Quanity (lbs)
Electroplating	3001	Cd, Cr Solutions,	636,175
		Alkaline Cyanide Waste, Mixed Acids, Perchloroethylene and Wax, Plastic Hoods	
Cleaning Surface Preparation	3001, 2122 3221, 289	Carbon Remover Rubber Remover Sodium Hydroxide Alkaline Permanganate Acids (Chromic, Phosphoric, Nitric, Hydroflouric) Emulsion Cleaner	978.745
Oil, Grease, Dirt Removal	3001, 12 3102, 240 2122, 2121, 229, 1055 2210, 230 3221, 1010 289	Halogenated Solvents (perchloroethylene, chloro benzene, trichloroethane, freon)	394,070
		Non-Halogenated Solvents (Methyl Ethyl Ketone, Acetone, Xylene, methanol, toluene)	
		Solvent Contaminated Rags	
Blasting Media	3001, 2122 289	Glass, Plastic, aluminum beads, (contains heavy metals, cd, cr, pb)	628,373

Process	Location Building #	Waste Streams	Quantity (lbs)
Paint Application	1, 17, 210 229, 230, 985 1010, 1068, 2101, 2102, 2121 2122, 2129, 2210 2280, 3001, 3125	Thinners, Acetone, Methyl Ethyl Ketone, Toluene, Tape Brushes, Rags, Clothing, Filters	145,755
Paint Removal	268, 766, 2121 2122, 2211, 2280, 3001, 3102	Methyl Ethyl Ketone, Phenols Methylene Chloride, Paint Chip Sludges Contaminated Rags, Brushes, Clothing, Filters	137,462
Parts Machining	3001, 3125, 3221, 2135, 2122, 210	Coolant Oil, Calibration Fluid, Penetrant, Emulsifier, Lapping Oil, Grinding Dust, Vibrating Rock	847,491
Periodic Maintenance Lubrication	976, 268, 414 6002, 2110, 2122, 2101, 2136, 240, 2121, 3102, 214	Used Oil, Hydraulic Fluid, Synthetic Oils (7808,5606) (May be solvent contaminated)	Recycle 223,817 Engy Recv 454,862
Fuel	230, 986, 985 210, 2211, 2210 3001, 3703, 3234, 3215, 1010, 220 283, 2111, 3108	JP-4, JP-5, JP-8, Mogas	Recycle 41,000 Engy Recv 491,654
Photographic	1, 283, 5801	Developer, Fixer, Hypos, Silver Recovery	40,000
Wastewater Treatment	3001, IWTP	Clarifier Residue, Oil Separator Bottoms, Pretreatment Sludge (Corrosives, and Toxic Metals)	8,617,404

Process	Location Building #	Waste Streams	Quantity (lbs)
Spill Cleanup	Throughout Base	Soil, Absorbents, Solvents Fuel	97,257
PCB Removal	Throughout Base	Equipment, Debris, Ballasts Small Capacitors	5,100
Corrective Action	Waste Fuel Dump Site 2 Radioactive Sites 1 Tank Farm	Soil Contaminated with Organics and Hydrocarbons	6,261,750
Miscellaneous	Throughout Base	Aerosol cans, Sermetal Paint Sealants, Glues and Adhesives Filters, Batteries, Mercury Instruments	25,000
1991 TOTAL			20,025,916 (10,013 tons)

TABLE 7

HAZARDOUS WASTE STORAGE SITES

	ORGANIZATION	BUILDING	LOCATION	TYPE	WASTE STREAM	REMARKS
1	2854CES/DECRO	62516	IWTP LAB	SAP[1]	Contaminated Ampules	Baxter 43114
2		Lift Sta.6		SAP	Paint Chips	Baxter 43114
3	2854ABG/MWRA	6002	Hobby Shop	SAP	Antifreeze, Transmission Fluid, Waste Oil, Waste Brake Fluid	Larry Stacy 45615
4	2854ABG	289		SAP	Dirt and Paint Chips	Jackson 43301
5	2854ABG/TPV	2101	Motor Pool, North Side	SAP	Paint Thinners	Dave McGrew 42777
6		2101	Motor Pool, Outside	SAP	Aerosol Cans	
7	2854ABG/TPV	267	Motor Pool, Outside	SAP	Aerosol Cans	
8	2854ABG/TPV	2110	Motor Pool, Outside	SAP	JP4 Fuel Filters	
9	2854CE	2101	Motor Pool, Outside	SAP	Sand & Dirt	Jackson 43301
10	2854ABG/DECEP	414	Power Production Shop, West Side	SAP	Oil/Waste, Diesel Fuel, Mogas, Antifreeze, Hyd.Fluid, Waste Paint Brushes, Used Fuel/ Oil Filters, Oily Rags	TSGT Fisher 44727/5030
11	2854CES	414		SAP	Contaminated AFFF Foam	Howell 42073
12	2854ABG/IMRA	1	Door 1	SAP	Developer, Perco, NAPA	Walker 42177
13	2854CE	3236		SAP	Oily Sludge	Jackson 43301
14	2854CE	976		SAP	Oily Sludge, Rock, Sand	Jackson 43301
15	2854CE	773	Outside	SAP	Sand & Dirt	Smith 47427
16	2854CE	7006	Outside	SAP	Wash Rack Sludge	Jackson 43301
17	2854CES	12	Heat Shop, Salvage	SAP	Hydrochloric Acid, Refrigerant Oil, Cappella	TSGT Riley 45295
18	2854DE	976		SAP	AFFF (Fire Fighting Foam)	Howell 42073.

1 Satellite Accumulation Point (SAP)

	ORGANIZATION	BUILDING	LOCATION	TYPE	WASTE STREAM	REMARKS
19	33CCS	1010	South of Bldg 1010 Outside Shed	SAP	Paint in Cans, Absorbent W/Oil Diesel, Aerosol Cans, Antifreeze, Lube Oil, Mogas, Contaminated Rags, Used Filters, Used Diesel	Barridlere & TSGT Harvey 47664
20	LPPPCD	3001	F-111, North Annex	SAP	7808 Oil, JP-4, Oil Dry	Newton 62392
21	LPPPEDD	3001 Post XY61-64	MOW/Penalty Subunit TF 30 Line	SAP	7808 Oil, Jet Fuel	James Turner 65707
22	LPPPFFB	3001 Post XY91-94	F110 Assembly Subunit	SAP	7808 Oil, Jet Fuel	Ken Lane 65712
23	LPPPEE	3001 Post XY77-84	Final Assembly Penalty Line TF33	SAP	7808 Oil, Jet Fuel	Lee Bauman 67802
24	LPPPEE	3001 Post X71	J 57 Assembly Unit	SAP	7808 Oil, Jet Fuel	Richard D. Glazier 67847
25 26 27	LPPPNAD	3221 Post A3 Post A1 Post A2	Surface Enhancement	SAP	Blast Media Paint Waste Sermetel Contaminated Paper	Gary Brady 63132
28	LPPPNAA	3221 Post M12	IWAG Cell	SAP	IWAG Waste	Donald Patterson 64220
29 30	LPPPNCA	3221 Post F21 Post A57	Cleaning Cell	SAP	Blade Cleaning Waste	Anthony P. Chapman 62962
31	LPPPCC	3001 Post D-103	Chemical Cleaning	SAP	Alkaline Trench Sludge	Steve Porter 65497
32 33 34 35	LPPPCE	3001 Post 53.41A Post 61.1GA Post 61.1IA Post M61	Solution Maintence Subunit (Plating Shop)	SAP	Aerosol Cans Acid-Nickel Filters Alkaline-Cyanide-Cadmium Filters Brush Plating Rags	Ernest Barlor 65280
36 37 38 39	LPPPCF	3001 Post J075-79 Post N75 Post L75 Post L77	Sermetel Paint/ Coating Subunit	SAP	Material Contaminated W/Sermetel Waste Paint & Thinners Empty containers of Sermetel(Anti Corrosive) Aerosol Cans	Frankie Harkins 63967

	ORGANIZATION	BUILDING	LOCATION	TYPE	WASTE STREAM	REMARKS
40	LPPPMC	3001 Post T85	Gear Box Unit	SAP	Oil, PD680, Perco, Lapping Oil and Sludge	Carl McLin 62789
41	LPPPNCC	3001	G-11	SAP	Blade Repair Penetrant Waste	Carolyn Clyma 64229
42	LPPPTAA	3703	Test Subunit #1	SAP	Used Oil, Fuel Hyd Fluid	Ernest Gains 62292
43	LPPPTBA	3703	Engine Preparation Subunit	SAP	Used Oil. Fuel	Wayne Simms 65848
44	LPPPTAC	3234	Test Subunit #3	SAP	Used Oil, Fuel	Paul Bauman 65965
45	LPPPTBB	2101 3703	Categorization/ Reclamation	SAP	Oil	Sammy Cain 67453
46	LPPPTBC	2101		SAP	Oil	Raymond Poe 65965
47	LPPPCF	3001 Post I77	Blasting Subunit	SAP	Perco and Blasting	Glen Gaines 63596
48	LPPPWSA	3001 Post B82	Seal Machine Subunit	SAP	Lapping Oil & PD680	Joseph Minor 67036
49	LPPPWW	3001 Post G83		SAP	Thoriated Nickel Grinding & Scrap Metal	Cole 63063
50 51	LPPPMDD	3001 Post KJ95-98 Post K97	Combustion Controls Shop	SAP	EDM Fluid Filters	Williams 62898
52	LPPPFFA	3001 Post Y104	F101 Engine Line	SAP	7808 Oil, Jet Fuel	Antonio Rodriguez 63535
53	LAPPAE	3102	Center Hangar	SAP	4 Part Cleaner, Hyd Fluid	Boldien 65290
54	LAPPBE	2122	F-40	SAP	Hyd Fluid, Aerosol Cans	White 64106
55	LAPPCA	2122	P-37	SAP	Glass Beads, Plastic Media	Edler 62338
56	LAPPCB	2280	South Dock	SAP	Paint Sludge, Waste Thinners	Jacobs 63107
57	LAPPEG	2136	Center West	SAP	Sealant Tubes	Felix 65393
58	LAPPFE	2121	C-11	SAP	Sealant Tubes, Primer	Jones 63534

	ORGANIZATION	BUILDING	LOCATION	TYPE	WASTE STREAM	REMARKS
59	LAPPFI	3102		SAP	Oil Dry, Hyd Fluid	Sheehan 62248
60	TIPPCM	3001		SAP	Solvents, Freon, Used Hyd Fluid	Hardaker 64191
61	TIPIS	2101	A-4	SAP	Waste Paints & Thinners	Stiles 62701
62	TIPIS	2102	SE Side	SAP	Waste Paints & Thinners	Roye 62701
63	TIPCC	3001 Post I63	Chemical Lab	SAP	Fuels, Oils & Solvents	George Garbrish 62135
64	TIPPCP	3125		SAP	Coolant Sludge	Voss 65791
65	EMCO	3125	West Side of Bldg 3001	SAP	Waste Paint	Bill Buley 44188
66	LIPPAA	210	D-4	SAP	Paint Thinner, Aerosols	Isaac Kimbro 65888
67	LIPPAE	214		SAP	JP-10 Fuel, 7808 Oil	Cordell Taylor 64111
68	LIPPAD	1055	B-8	SAP	Waste Trichloroethane	Bob Young 65550
69	LIPPAD	1055	D-8	SAP	Waste Freon	Bob Young 65550
70	LIPPAD	1055	Kitting	SAP	Radium 226 005 MC	Bob Young 65550
71	LIPPAD	1055	Outside	SAP	Waste Xylene, Alcohol, Thinner	Bob Young 65550
72	LIPPCC	3001	T-43	SAP	Waste Freon	Mike Tucker 65729
73	LIPPCC	3001	Fuel Flow Transmitters	SAP	Used Damping Fluid, 7808 Oil	Pam Hawkins 65274
74 75 76	LIPPCD	3001 Post S43 Post T43 Post V43			111Trichloroethane Lube Oil 1010 Freon	
77 78	LIPPCC	3001 Post S39 Post S53	Fuels Control	SAP	TrichlorotriFluoroethane (Freon) Waste Paint, Aerosol Cans	Sandra Wishon 64189

	ORGANIZATION	BUILDING	LOCATION	TYPE	WASTE STREAM	REMARKS
79	LIPPAF	230	C-22	SAP	Waste Paint	A.J. Czajoski 65938
80	LIPPAF	230	T-12	SAP	Waste Freon	John Traylor 65178
81	LIPPAF	230	D-22	SAP	Waste Trichloroethane	A.J. Czajoski 65938
82	LIPPAL	229		SAP	Ammonia, PD680,MEK Rags, Aerosol Cans	Wayne Collier 63590
83	LIPPBH	2210	A-8	SAP	Waste Freon, Waste Oil	Gary Gilley 67348
84	LIPPBH	2210	D-2	SAP	Waste Freon	John Welch 65317
85	LIPPBH	2210	E-8	SAP	Waste Paint, Aerosol Cans	John Welch 65317
86 87	LIPPCE	3001 Post P51 Post P51	Fuels Control	SAP	Waste Freon PD680	Chris Sullins [illegible]
88 89	LIPPCE	3001 Post M56 Post M57	Bearing Shop	SAP	Waste PD680, Alcohol Contaminated Pigs W/PD680, Carbon Remover	Shirley Smith 67035
90	LIPPMS	3001	K-73	SAP	Waste Trichloroethane Rags	Charles Dostel 67075
91	LIPPMS	3001 Post KC51	Tank & Cooler Subunit #5	SAP	Waste Paint, Aerosol Cans	Joe Balthrop 62323
92	LIPPBC	2129 Post D10		SAP	Waste Paint, Aerosol Cans	Dan Froehlich 62972
93	LIPPBC	2211		SAP	MEK Rags, Aerosols	Stewart Williams 62972
94	552 ACW	976	Alert Area	SAP	JP-4, 5606 Oil, 7808 Oil	Capt Rydel 47124
95	DSFFCC	1	Rm D	SAP	Paint Material	
	TENANT ORGANIZATION					

	ORGANIZATION	BUILDING	LOCATION	TYPE	WASTE STREAM	REMARKS
96	507 TFG	1068	SW Corner	SAP	Paint Thinners	
97	552 ACW	766	Southside	SAP	Paint Sludge, Solvent Rags, Aerosol Cans	Sanford Daniels 44303
98	552 ACW	289	Northside	SAP	Paint Sludge, MEK Rags, JP-4, Hyd Fld, Oily Rags, Paint Stripper, Thinners-Poly-Enam-Mek, Sand Blast, Media, Aerosol Cans	Richard Baugh 45234
99	552 ACW	230	Rm 111-A	SAP	Freon, Oils	Capt Rydel 47124
100	552 ACW	230	Rm 111-B	SAP	Hydraulic Fluid, MEK	Richard Sanderbeck 47105
101	552 ACW	230	Jet Shop	SAP	Oily Rags, Aerosol Cans	Robert Roche 47001
102	552 ACW	230	Phase, Dock 4	SAP	Oily Rags, Hyd Oil, Spd Dry w/ Oil, Paint , MEK	George Monsevalles 42883
103	552 ACW BOEING AEROSPACE CONTRACTOR	230	SE Corner of Dock 3	SAP	Skydrol Hydraulic Fluid	Nolan Webster 42974
104	552 ACW	220	West Side	SAP	Spdy Dry, Mixed Fuels, Fuel and Oil Filters, JP4, Mogas, Diesel, Oily Rags, 7807, 1711B, 5606, 30 wt Oil, Antifreeze, Glycol	Michael Butler 45479
105	552 ACW	985	South Side	SAP	Speedy Dry w/Hyd, Gly/Fuel, Diesel/JP4, Hyd Fluid/Glycol, Fuel/Oil, Gas Filters, Oil Filters, Glycol, 30 wt Oil, Hyd Fluid	Capt Rydel 47124
106	1845 EEG Graphics Area	4014	North of Bldg	SAP	Alcohol Based Developer	Bob Meadows 49229
107	Jones Cont.	2101	NW Corner	SAP	Oil, Paint, Cans	
108	Paint Cont.	17	N Side	SAP	Paint Material, Cans	
109	Motor Pool(TPVM)	2101	N Side	SAP	Oil, Antifreeze	Stiles 62701

	ORGANIZATION	BUILDING	LOCATION	TYPE	WASTE STREAM	REMARKS
110	LAPEP	2137(DRUMS)	Outside	[1]TSS	Paint Chip Sludge W/Phenol, Methelyne Chloride	John Carey 65986
111	TIPPCP	2135(TANKS)		TSS	Coolant Oil, Water HeavyMetal	Voss 65791
112	EMCO	3125(DRUMS)	West Side of Bldg 3001	TSS	Varies	Bill Buley 44188
113	EMCO	3105(DRUMS)	North Side of Bldg 3105	TSS	Varies	Bill Buley 44188
114	EMCO	1005(DRUMS)	West Side of the Base	TSS	Varies	Bill Buley 44188
115	LPPPCC	3001 Post CD101-103 (7 TANKS)	Cleaning Subunit #1 Chemical Cleaning	TSS	Cee-Bee J84 & Cee-Bee C46	Steve Porter 65497
116	LPPPNCA	3221 (5 TANKS)	F-21	TSS	Alk Permanganate, NaNO/3, Acids, Phenols, Metals	Anthony P. Chapman 62962
117	LIPPAB	210 (TANK)	K-4	TSS	7808 Oil	Isaac Kimbro 65888
118	LIPPAE	214 (TANK)	SW Corner	TSS	7808 Oil, JP-10 Fuel	Cordell Taylor 64111
119	LIPPMS	3001 (1TANK) Post KC50	Tank & Cooler Subunit #5	TSS	PD680	Joe Balthrope 62323

1 Temporary Storage Site (TSS)

TABLE 8

SUMMARY OF LANDFILLS AT TINKER AIR FORCE BASE

Landfill	Period of Operation	Approximate Area (Acres)	Types of Wastes	Estimate Quantity (YD^3)	Method of Operation	Closure Status	Geological Setting	Surface Drainage	Comments
1	1942-1945	1.2	General Refuse	30,000	Burning, Trench	RCRA Cap MW's 1991	Fine-grained sandstone; shale and mudstone	To Crutcho Creek	Annual MW Samples
2	1945-1952	20	General refuse, probably some industrial waste	560,000	Trench	RCRA Cap, MW's Planned 1993	Fine-grained sandstone; shale and mudstone	To Crutcho Creek	Annual Smpls Leachate Collection 1993
3	1952-1961	.8	General refuse, probably some industrial waste	200,000	Trench	RCRA Cap MW's 1991	Fine-grained sandstone; shale and mudstone	To Crutcho Creek	Annual MW Samples
4	1961-1968	16	General refuse, probably some industrial waste, and POL sludges	400,000	Trench	RCRA Cap, MW's Planned 1993	Fine-grained sandstone; shale and mudstone	To Crutcho Creek	Annual Smpls Leachate Collection 1993
5	1968-1970	3	General Refuse, probably some industrial waste	75,000	Trench	Capped, MW's 1990	Fine-grained sandstone; shale and mudstone	To Crutcho Creek	Leachate Collection 1993
6	1970-1979	11	General Refuse, probably some industrial waste, and industrial waste treatment sludge	500,000	Trench	Earthen Cover 1986	Terrace; sand, silt, clays	To Soldier Creek	Covered and graded. No waste visible.

TABLE 9

SUMMARY OF RADIOACTIVE WASTE DISPOSAL SITES

Landfill	Period of Operation	Approximate Area (Acres)	Types of Wastes	Estimate Quantity (YD^3)	Method of Operation	Closure Status	Geological Setting	Surface Drainage
RWDS 62598	Unknown	<0.1	Radioactive "lead still" used for distilling acetone	<10	Pit	Removal Completed 1991	Fine-grained sandstone; shale and mudstone	To Khulman Creek
RWDS 201S	Unknown	<0.1	Low-level radioactive radium paint solids	<10	Pit	Removal Planned 1993	Fine-grained sandstone; shale and mudstone	To Crutcho Creek
RWDS 1022E	Late 1950's	<0.1	Low-level radioactive wastes	<10	Pit	Removal Completed 1991	Fine-grained sandstone; shale and mudstone	To Crutcho Creek
RWDS 1030W	Prior to 1955	<0.1	Low-level radioactive wastes.	<10	Pit	Now Being Removed	Fine-grained sandstone; shale and mudstone	To Crutcho Creek

9.0 ENVIRONMENTAL UNDERSTANDING AND ACCOMMODATION

9.1 PREVIOUS STUDIES

Primarily in response to enactment of the Comprehensive Environmental Response Compensation and Liability Act(CERCLA) in 1980 the U.S. Air Force established an Installation Restoration Program(IRP). The purpose of this program was to study the extent of contamination at Air Force installations, devise methods of remediating the sites, and proceed with the remediation. IRP activity began at Tinker AFB in 1981 when it was soon realized that to determine extent of contamination the environmental setting of the installation would first have to be established. Thus, over the next three to four years, extensive investigations and record searches were performed to outline such parameters as soil types, geology, ground water occurrence, surface water quality, weather patterns, and air quality. In addition a search for possible contamination sources was conducted which resulted in discovery of an array of old landfills, waste pits, fire training areas, contaminated storm sewers, and areas of ground water contamination. In 1985 reports by Radian Corporation, a prime initial contractor, related these contamination sources to the environmental setting and recommended a priority listing of sites to receive further attention. The Building 3001 groundwater plume, however, diverted most attention when it was placed on the National Priority List and declared a Superfund Site. Thus, much effort and resulting reports over the next four years are devoted to that site.

Once the basic environmental setting had been established, however, more attention was devoted to individual contamination sources. In the late 1980's reports were published on Underground Storage Tanks, the POL (Fuel Farm) Facility, Fire Training Areas, Waste Pits, and the Radiation Waste Disposal Sites. By 1990 much attention was being given to remediation of the six old landfills. Remedial investigation reports were published for the proposed correction of Landfills 1, 3, 5, and 6. Within the last two years important studies have been completed on Soldier Creek contamination, surface water quality of all base water bodies, plating shop renovation, horizontal drilling into the Building 3001 contamination plume, and remediation of two radiation waste disposal sites. More information about these studies can be found in Part C, Section IV (Identification and Summary of Previous Studies) of this document.

9.2 INTERIM MEASURES

The Installation Restoration Program(IRP) progressed to the stage of actually mitigating threats to the environment starting in 1986. This first action was construction of a clay cap over Landfill 6. Similar caps were placed on Landfills 1, 3, and 5 from 1990 to 1991. Caps on Landfills 2 and 4 are planned for 1993.

At the two Waste Pits monitor well clusters were installed to check for ground water contamination. They were installed in 1989 at Waste Pit 2 and in 1991 at Waste Pit 1. Samples will be taken annually.

Monitor wells are also to be installed at Fire Training Areas 1, and 2 in 1993. These will also be sampled annually.

A Solidification/Stabilization project was completed at the Supernatant Pond in October 1992. Because analysis of soil samples beneath the pond revealed no hazardous constituents the project was more a demonstration of methodology than mitigation of environmental threat. Monitor wells were also installed at the Supernatant Pond and will be sampled on an annual basis.

Remediation has been completed at two Radiation Waste Disposal Sites (1022E and 62598) and nearing completion at 1030W. Excavation of the sites discovered radiation contaminated objects at 1022E and 1030W but found none at 62598. Excavation at another suspected radiation site (201S) is planned for 1993.

Excavation of abandoned waste tanks and surrounding soil contaminated with metals and solvents took place from July to September 1992 at the Industrial Waste Treatment Plant. About 1200 cubic yards of hazardous soil and debris were transported for appropriate treatment and disposal.

A plume of aircraft fuel beneath the Fuel Farm in the north central part of the base was remediated from 1987 to 1989. A total of 1450 gallons of fuel was pumped out of the ground through two recovery wells.

In 1986 approximately 7500 cubic yards of contaminated sediment were removed from the bed of Soldier Creek. Removal was based on visible contamination along the sides and bottom of the creek bed.

During 1991 and 1992 various actions have taken place in the North Tank area northwest of Building 3001 where a plume of petroleum products was discovered on perched aquifers. The actions include removal of tanks, pumping from recovery wells, and installation of monitoring wells.

At the Southwest Tank area southwest of Building 3001 two UST's have been removed and work is proceeding on fifteen more most of which have some product remaining in them.

Remediation of the Superfund site at Building 3001 is proceeding. Three water supply wells had been plugged by 1988, and a concrete cap over Pit Q-51 was completed in 1990. The ground water treatment plant is scheduled for completion in February 1993. This plant will treat ground water pumped from the contamination plume.

Approximately 350 cubic yards of petroleum product contaminated soil was removed from the Waste Fuel Dump Site in the east central part of the base in 1991. A bioremediation project is scheduled for this site beginning in 1993.

At the Sludge Drying Beds (SWMU 14) monitoring wells will be installed in 1993 to determine groundwater quality at that location.

For more detailed information about interim measures performed at Tinker AFB please refer to Part C, Section I(Implementation of Interim Measures) of this document.

9.3 PERMITS

Environmental permits issued to Tinker AFB include the following:

(1) Air Emission permits issued by the Oklahoma City-County Health Department,

(2) National Pollutant Discharge Elimination System (NPDES) permit issued by the Environmental Protection Agency and the Oklahoma Water Resources Board,

(3) Sanitary Sewer System Discharge permit issued by the City of Oklahoma City Water Resources Department.

(4) RCRA Part B Operating permit issued by the Environmental Protection Agency and the Oklahoma State Health Department.

Copies of the first three above listed permits can be found in Appendix C: Tinker AFB Environmental Permits. The RCRA Part B Operating permit is the document that controls hazardous waste management at Tinker AFB, and is the authority for submittal of this Facility Background.

APPENDIX A

APPENDIX A: LAND OWNERSHIP AT BOUNDARIES OF TINKER AFB

LOT	OWNER	ADDRESS
MAP 1320		
16-852-3225	Nigh, Grace	4725 SE 22nd St Del City, OK 73115
MAP 1430		
16-850-1310	Oklahoma County	320 Robert S Kerr Room 101 OKC, OK
Map 1434		
15-139-4905	Wal-Mart Properties, Inc	702 SW 8th Bentonville, AR 72716
15-139-4930	Donald A. Harris	6569 SE 29th Oklahoma City, OK
15-139-4895	Harris Ford Co.	Box 10410 Midwest City, OK 73110
15-139-4920	Holman,Marguerite C. TRST Holman,Marguerite C. Rv Trs	101 Lake Aluma Oklahoma City, OK 73121
15-015-1500 Kuhlman Comm Dist Block 4	Fina Oil and Chemical Co.	8350 N. Central Dallas, TX 75206
15-025-1300 Kuhlman Comm Dist Lot 3, Blk 2	Pitrock Realty Corp. 6909 SE 29th	650 Park Ave. New York, NY 10021
15-139-5100	McKeown, Irene A	3108 Glen Valley Midwest City, OK 73110
15-138-0700 Christensen Sub Add Lots 7-11, Blk 1	1st National Bank of Midwest City	Box 10600 Midwest City, OK

MAP 1435

14-498-9000	Thomas Warren W CO TRS Mitchell Dale E CO TRS	Box 32838 Okla. City, OK
14-498-9010	Thomas Warren CO TRS Mitchell Dale E CO TRS	Box 32838 Okla. City, OK
15-139-8025	Thomas Warren W CO TRS Mitchell Dale E CO TRS	Box 32838 Okla. City, OK
15-139-8050	Thomas Warren W CO TRS Mitchell Dale E CO TRS	Box 32838 Okla. City, OK
15-139-6005	Thomas Warren CO TRS Mitxhell Dale E CO TRS	Box 32838 Okla. City, OK
15-139-6035	White James K Sr & Billie J	Box 411 Nicoma Park, OK
15-139-7560	Bruce Leo	% Kaye D Bruce 520 Sanford Ave. Richland, WA
15-139-5900	Rainey Dixie Dotson	6121 SE 29 Midwest City, OK
15-139-6500	Rainey Artie R & Dixie E	6121 SE 29 Midwest City, OK
15-139-6100	Rainey Dixie Dotson	6121 SE 29 Midwest City, OK
15-139-7000	Protective Life Insurance Company	Box 2606 Investment Dept Birmingham, AL
15-139-7550	Protective Life Insurance Company	Box 2606 Investment Dept Birmingham, AL
15-139-7700	Alvarado Margie L	1030 N Park Ave Palatine, IL
15-139-7770	Wal-Mart Properties Inc	702 SW 8 Bentonville, AR

MAP 1438

15-038-5520 Block 6 Lots 1-4	Atkinson Properties & Investments Inc	Box 10657 Midwest City, OK
15-038-5760 Block 6 Lots 5-8	Mihir Investments Inc.	% Jagdish Patel 7301 SE 29 Midwest City, OK
15-038 Block 7 Lots 1-9		
15-038-6800 Block 7 W 37.59ft of Lot 10	Tinker Plaza View Apartment LTD	Box 10657 Midwest City, OK
15-038-6805 Block 7 Ely 20ft Lot 10	Shakir M A	1435 N Rockwell Okla. City, OK
15-038-6880 Block 7 Lot 11	Shakir M A	1435 N Rockwell Okla. City, OK
15-038-6960 Block 7 Lot 13 plus W 14ft of E 143ft of block 23 Atkinson Heights Add.	Fisher Randy P & Deboran K	Rt 8 Box 111 Guthrie, OK
15-038 Block 7 Lot 12		
15-014-6645 Block 28 Lot 18	Miller Operating Co	Box 10834 Midwest City, OK
15-013-1075	Miller Operating Co	Box 10834 Midwest City, OK
15-013-6300	Miller Operating Co	% Dorothy J. Miller Box 10834 MIdwest City, OK

15-013-6310	U-Haul Real Estate Co	2721 N CentralAve Phoenix, AZ
15-013-6385	U-Haul Real Estate Co	2721 N CentralAve Phoenix, AZ
15-013-6030	Atkinson H B	Box 10775 Midwest City, OK
15-013-6060	Hudiburg Paul & H J	I-40 & Hudiburg MIdwest City, OK
15-013-6305	Hudiburg Paul	I-40 & Hudiburg Midwest City, OK
15-013-6315	Hudiburg Paul & H J	Hudiburg K H I-40 & Hudiburg Midwest City, OK
15-013-1005	Hudiburg Steven Paul Trust	I-40 & Hudiburg Midwest City, OK

<u>MAP 1439</u>

15-013-3500		
15-013-0950		
15-013-1250		
15-014-0720 Block 3 Lot 1	Kline Kole Wm B & K	307 W Louisiana Anadarko, OK
15-014-0735 Block 3 Lot 2	Boone Eugene & Jewel	202 W. Fairchild Okla. City, OK
15-014-0750 Block 3 Lot 3	Northcutt Walter G Gray Charles	50 Penn Pl Rm 1330 Okla. City, OK
15-014-0765 Block 3	Foster Earl & Dovie	206 W Fairchild Midwest City, OK

Lot 4

15-014-0780 Block 3 Lot 5	Abbott Harry L & J	208 W Fairchild Okla. City, OK
15-014-0795 Block 3 Lot 6	Thompson C M Etux	210 W Fairchild Midwest City, OK
15-014-0810 Block 3 Lot 7	George Hazel Ruth Hayes Fred B	212 W Fairchild Midwest City, OK
15-014-0825 Block 3 Lot 8	Rester Clarence E Jr & S L	214 W Fairchild Midwest City, OK
15-014-0840 Block 3 Lot 9	Bowman Margaret M	3620 Garden View Midwest City, OK
15-014-0855 Block 3 Lot 10	Doke Chas K & Jo	Rt 1 Ft Cobb, OK
15-014-0870 Block 3 Lot 11	Gilbert J P	Rt 4 Box 167 Tuttle, OK
15-014-2675 Block 10 23.2 ft. Lot 21 All Lots 22 & 23	Atkinson H B	Box 10775 Midwest City, OK
15-014-2670 Block 10 W1/2 Lot 19, All Lot 20 & E 1.8ft. Lot21	Atkinson Properties & Investments Inc	Box 10657 Midwest City, OK
15-014-2660 Block 10	West Plaza Invest Company	Box 10657 Midwest City, OK

a vacated Tr adj on
S&SEly Sides & all Lots 17, 18, & E1/2 Lot 19 Desc as Beg at SE/C Lot 17 th W62.5ft N137.4ft Nly 18.7ft. NEly 96.24ft th SWly 110.06ft th S95ft to beg Plus All Lots 10 thru 16

15-014-2625 Block 10 Lots 4 thru 9	Atkinson Properties & Investments Inc	Box 10657 Midwest City, OK

Block 21 Lots 4 thru 23		
15-014-1740 Block 6 1	Herndon C I & Nanette	% Hugh Herndon 2101 S Air Depot Lot Midwest City, OK
15-014-1755 Block 6 Lot 2	Roones Alfred H & Sharon K	202 W Douglas Dr Midwest City, OK
15-014-1770 Block 6 Lot 3	Gabables Anthony	204 W Douglas Dr Midwest City, OK
15-014-1785 Block 6 Lot 4	Robertson John Earl & Roberta	206 W Douglas Dr Midwest City, OK
15-014-1795 Block 6 Lot 5	Long Jeffrey J & Kimberly K	208 W Douglas Dr Midwest City, OK

<u>MAP 1442</u>

15-021-2710	United States of America	

<u>MAP 1443</u>

15-021-7510	Cooper Jackie R	6806 Grand Blvd Okla. City, OK
15-021-7002	Hudiburg Paul Etal	I-40 & Hudiburg MIdwest City, OK
15-021-1025	United States of America	
15-032-2075 Blocks 8 & 9	United States of America	
15-032-2065	United States of America	
15-032-2050	United States of America	% Tulsa Dist. Corps of Engineers Box 61 Tulsa, OK
15-032-2055	Unites States of America	
15-021-1050	United States of America	

15-021-2710

MAP 1451

14-383-7410	Reid Gail Sr & Thelma	4401 Easy St. Okla. City, OK
14-383-7420	Reid Gail Jr Etal	% Gail Reid Sr 9200 SE 29 Midwest City, OK
14-383-7405	Adams Peter P Adams Elsie M	10309 SE 44 Okla. City, OK
14-383-8600	Mary Holloway Inc	100 S Vermont Okla City OK
14-383-8800	Mishak Baptist Church	
14-383-7600	Shoemake Ethelyn D	2705 Tudor Rd Okla. City, OK
14-383-6200	Riggle Floyd R & Emma L	9200 SE 36 Okla. City, OK
14-383-6000	Burtoon Leonard H & Janice I	4300 S Douglas Okla. City, OK
14-383-6100	Burton Leonard H & Janice	4300 S Douglas Okla. City, OK
14-383-6400	AFGE Charitable & Education Foundation	4444 S Douglas Okla. City, OK
14-383-8400	AFGE Local 916 Charitable & Educational Foundation Inc	4444 S Douglas Okla. City, OK

MAP 1452

14-383-3400	N R Fard Inc.	3620 S Douglas Okla. City, OK

MAP 1453

Kimsey Addition Blk 2 Lot 13	Crone Francis P & Zelma Trs	3261 S Douglas OKC, OK 73150
Kimsey Addition Blk 3	Bagley Janie Sue	3256 Airway Ave Midwest City, OK

Lot 15

Kimsey Addition Blk 4 Lot 15	Orr Paul E Jr & Nadege D	11609 N 190 E Ave Collinsville, OK 74021
Kimsey Addition Blk 4 Lot 14	Orr Paul E Jr & Nadege D	11609 N 190 E Ave Collinsville, OK 74021
Kimsey Addition Blk 4 Lot 13	Fleet Finance Inc	14 Perimeter Park Rm 102 Atlanta, GA 30341
Kimsey Addition Blk 4 Lot 12	Spencer, Robert G & Lavella	Box 96888 OKC, OK 73143
Kimsey Addition Blk 4 Lot 11	Whorton, Joseph E & M	3241 Airway Ave OKC, OK 73110
Kimsey Addition Blk 4 Lot 10	Whorton, Rodvey D Bonnie L	3237 Airway Ave MWC, OK 73110
Kimsey Addition Blk 4 Lot 9	Lemming, Emma A	3233 Airway Ave Okla, OK 73110
Kimsey Addition Blk 4 Lot 8	Power, Melton W	3229 Airway Ave MWC,OK 73110
Kimsey Addition Blk 4 Lot 7	Penner, John Graden	3225 Airway Ave MWC, OK 73110
14-384-1515	Power, John Rex & Melton W	Rt 3, Box 419 McLoud, OK 74851
14-384-4500	Jorski, Andrew L	3621 Engle Rd MWC, OK 73110
14-384-3010	Tucker, Bill & Marlene	8600 Hensley Dr OKC, OK 73110
Unnumbered Plat	State of Oklahoma Interstate 40 Highway	
15-670-3000	Harris, Donald	6601 SE 29 Box 10410 MWC, OK 73140

14-384-4510	Testerman, JH & Laura	3603 Engle Rd OKC, OK 73110
14-384-4000	Richards, Lawrence & Kathryn	3601 Engle Rd MWC, OK 73110
Engle Rd Addition Lot 21,22,24	Malone Carl T & P	3503 S Engle Rd OKC, OK 73110
Engle Rd Addition Lot 23	Malone Sammy C & Debra J	8700 SE 34 MWC, OK 73110
Engle Rd Addition Lot 13,14,15,16, 17,18,19,20	Gordon, Charley & M	3307 Engle Rd OKC, OK 73110
Universal Homes Blk 4 Lot 10	Brown Kie	8817 SE 35 OKC, OK 73110
Universal Homes Blk 4 Lot 11	Dale, Robert N	1825 Maryland Ashtabula, OH 44004
Universal Homes Blk 4 Lot 12	Jones, Paul L & Charlotte Sue	807 N University Norman, OK 73069
Universal Homes Blk 4 Lot 13	Phillips, Shirley G	8805 SE 35 OKC,OK 73110
Universal Homes Blk 4 Lot 14	Holm, Genea & TA	8801 SE 35 OKC,OK 73110

Map 1465

15-392-0110	City of Del City	
15-392-0105	Red River Federal Savings & Loan Association	%1st Federal S&L
15-392-0127	The Creekwood Co	Box 25523 OKC, OK
15-329-0125	Rick Inc	Box 15329 Del City, OK

Map 1477

14-918-3000	Gaines, James F &	1315 S Hisel

	Betty J etal	Del City, OK
<u>Map 1482</u>		
1482-14-228-1000 Block 001 Lot 10	Whitaker, Mark L	2514 SW 56 OKC, OK
1482-14-228-0900 Block 001 Lot 9	Sparks, Lois L	2510 SW 56 OKC, OK
1482-14-228-0800 Block 001 Lot 8	Fraternal Order of Police #123	1624 S Agnew Ave OKC, OK
1482-14-228-0700 Block 001 Lot 7	Rogers Wesley E & Eva J	5301 Runway Rd OKC, OK
1482-14-228-0600 Block 001 Lot 6	Gable, William C & Marion A	Box 19 Essex, CA
1482-14-228-0500 Block 001 Lot 5	Wesley, Barbara	6609 SE 53 OKC, OK
1482-14-228-0400 Block 001 Lot 4	Foshee Bill & Mildred M	6608 SE 53 OKC, OK
1482-14-228-0300 Block 001 Lot 3	Foshee Bill & Mildred M	6608 SE 53 OKC, OK
1482-14-228-0200 Block 001 Lot 2	Foshee Bill & Mildred M	6608 SE 53 OKC, OK
1482-14-228-0100 Block 001 Lot 1	Barrett, Hama M & Rita J	5724 Runway Rd OKC, OK
1482-14-228-1100 Block 002 Lot 1	Foshee Bill & Mildred M	6608 SE 53 OKC, OK
1482-14-228-2200 Block 002 Lot 12	Ross Rosie LF Est Ross Sandra J Etal McGill Morcella Jean	5527 SE 55 OKC, OK

1482-14-228-4700 Block 005 Lot 001	Patrick Xien Thi	5228 SE 56 OKC, OK
15-424-0600	Readdy Pipe Threading Co Inc	6811 SE 59 OKC, OK
15-424-0500	Gene Geren Co Etal	Box 32841 OKC, OK

Map 1483

12-008-2080 Block 10 Lot 16	Franz, Thomas H &	6216 Cloverlawn OKC, OK

Map 1484

15-424-3000	Harbin, Melvin H Frolich Paul etal	2117 Banbury Ln OKC, OK
12-101-0900 Legal Common Areas AB&C	American First Title & Trust Co	%American Guaranty Title 4040 N Tulsa OKC, OK
12-101-1000 Block 001 Lot 1	Oklahoma County	320 Robert S Kerr Room 101 OKC, OK
12-101-1010 Block 001 Lot 2	Oklahoma County	320 Robert S Kerr Room 101 OKC, OK
12-101-1020 Block 001 Lot 3	Oklahoma County	320 Robert S Kerr Room 101 OKC, OK
12-101-1030 Block 001 Lot 4	Oklahoma County	320 Robert S Kerr Room 101 OKC, OK
12-101-1040 Block 001 Lot 5	Oklahoma County	320 Robert S Kerr Room 101 OKC, OK
12-101-1050 Block 001 Lot 6	Oklahoma County	320 Robert S Kerr Room 101 OKC, OK

12-101-1060 Block 001 Lot 7	Oklahoma County	320 Robert S Kerr Room 101 OKC, OK
12-101-1070 Block 001 Lot 8	Oklahoma County	320 Robert S Kerr Room 101 OKC, OK
12-101-1080 Block 001 Lot 9	Oklahoma County	320 Robert S Kerr Room 101 OKC, OK
12-101-1090 Block 001 Lot 10	Oklahoma County	320 Robert S Kerr Room 101 OKC, OK
12-101-1100 Block 001 Lot 11	Oklahoma County	320 Robert S Kerr Room 101 OKC, OK
12-101-1110 Block 001 Lot 12	Oklahoma County	320 Robert S Kerr Room 101 OKC, OK
12-101-1120 Block 001 Lot 13	Oklahoma County	320 Robert S Kerr Room 101 OKC, OK
12-101-1130 Block 001 Lot 14	Oklahoma County	320 Robert S Kerr Room 101 OKC, OK
12-101-1140 Block 001 Lot 15	Oklahoma County	320 Robert S Kerr Room 101 OKC, OK
12-101-1150 Block 001 Lot 16	Oklahoma County	320 Robert S Kerr Room 101 OKC, OK
12-101-1160 Block 001 Lot 17	Oklahoma County	320 Robert S Kerr Room 101 OKC, OK
12-101-1170 Block 001 Lot 18	Oklahoma County	320 Robert S Kerr Room 101 OKC, OK
12-101-1180 Block 001 Lot 19	Oklahoma County	320 Robert S Kerr Room 101 OKC, OK

12-101-1190 Block 001 Lot 20	Oklahoma County	320 Robert S Kerr Room 101 OKC, OK
12-101-1200 Block 001 Lot 21	Oklahoma County	320 Robert S Kerr Room 101 OKC, OK
12-101-1210 Block 001 Lot 22	Oklahoma County	320 Robert S Kerr Room 101 OKC, OK
12-101-1220 Block 001 Lot 23	Oklahoma County	320 Robert S Kerr Room 101 OKC, OK
12-101-1230 Block 001 Lot 24	Oklahoma County	320 Robert S Kerr Room 101 OKC, OK
12-101-1240 Block 001 Lot 25	Oklahoma County	320 Robert S Kerr Room 101 OKC, OK
12-101-1250 Block 001 Lot 26	Oklahoma County	320 Robert S Kerr Room 101 OKC, OK
12-101-1260 Block 001 Lot 27	Oklahoma County	320 Robert S Kerr Room 101 OKC, OK
12-101-2100 Block 003 Lot 032	Larson, Dennis L Larson, Karen K	10324 Alicia MWC, OK
12-101-2110 Block 003 Lot 33	Hanks, Cathy L	4706 Love Dr OKC, OK
12-101-2120 Block 003 Lot 34	Jackson, Lisa	11026 Draper Choctaw, OK
12-101-2130 Block 003 Lot 35	Howard, Teddy J	Box 15162 Del City, OK
12-101-2140 Block 003 Lot 36	Howard, Teddy J	Box 15162 Del City, OK

12-101-2150 Block 003 Lot 37	Williams Isaac Jr & Jeanetta	301 Pheasant Run Edmond, OK
12-101-2160 Block 003 Lot 38	Gregg, DAvid G & Mary M	6227 SE 46 OKC, OK
12-101-2020 Block 003 Lot 24	Muncy Enterprises Inc	10712 Indian Hill Norman, OK
12-101-2030 Block 003 Lot 25	Muncy Enterprises Inc	10712 Indian Hill Norman, OK
12-101-2040 Block 003 Lot 26	Hearn Investments Corp	%Cormack P Hearn Sr Box 30887 MWC, OK
12-101-2050 Block 003 Lot 27	Titus, Shannon L	4020 Oak Brook Dr Del City, OK
12-101-2060 Block 003 Lot 28	Littlefield, George E Littlefield, Kyle E Barker, Susie P	4716 Love Dr OKC, OK
12-101-2070 Block 003 Lot 29	Patton, Mark Anthony	%Jimmie Lewis 11809 SE 44 OKC, OK
12-101-2080 Block 003 Lot 30	Hearn Investments Corp	Box 30887 MWC, OK
12-101-2090 Block 003 Lot 31	Williams, Isaac A Jr	301 Pheasant Dr Edmond, OK
12-101-2170 Block 003 Lot 39	Mendez Marnel & Valentina	2105 NW 17 OKC, OK
12-101-2180 Block 003 Lot 40	Richview Investment Corp	1915 Monticello Ct Dunwoody, GA
12-101-2190 Block 003 Lot 41	Muncy, Lester O	10712 Indian Hill Norman, OK

12-101-2200 Block 003 Lot 42	Lewis, Brian Scott	6219 SE 46 OKC, OK
12-101-2210 Block 003 Lot 43	Stewart Albert &	6217 SE 46 OKC, OK
12-101-2220 Block 003 Lot 44	Breckenridge, Alma K	6215 SE 46 OKC, OK
12-101-2230 Block 003 Lot 45	Wuu, Mei	7419 Onyx Dr SW Tucoma, WA
12-101-2240 Block 003 Lot 46	Muncy Enterprises Inc	4520 S Bryant OKC, OK
12-101-2250 Block 003 Lot 47	Stevenson Leonard J Jr & Lynda	5617 A Persimmony Shaw AFB, SC
12-101-2260 Block 003 Lot 48	Barnes, Bobby L Bradburn, Judy C	6207 SE 46 OKC, OK
12-101-2270 Block 003 Lot 49	Mowery, Charles &	5533 Keith DR OKC, OK
12-101-2280 Block 003 Lot 50	Hearn Investment Corp	613 Country Club MWC, OK
12-101-2290 Block 003 Lot 51	Porterfield, Albert & Joyce	206 Kelly Moore, OK
12-101-2300 Block 003 Lot 52	Nelson Bradley Jon & Paula J	1316 SW 110 Pl OKC, OK
12-101-2400 Block 003 Lot 62	Williams, Isaac A Jr & Jeanetta	301 Pheasant Run Edmond, OK
12-101-2410 Block 003 Lot 63	Crocker Chester O Jr & Gwyueth	4602 Creek Ct OKC, OK
15-424-2095	Independent School District #52	

15-424-2105	Independent School District #52	
16-850-2090	United States Of America	Corps of Engineers Box 17300 Ft Worth, TX
15-901-1000 Royal Park Sooner Rd	Meridian Investments Inc DBA MII Properties	Box 660193 Dallas, TX

Map 1494

16-850-2250 Oklahoma County
Tinker Training Annex (Gator Site) NW4 Sec 30, T 11 N R 1 W, Indian Meridian

Map 1495

16-850-2300	Okla City Municipal Improvement Authority	

Map 1496

14-387-3025	Okla Industries Authority	Three Santa Fe Plaza OKC, OK
14-387-1515	Mitchell, Ronnie J	4805 S Dees OKC, OK
14-387-3040	Symes, Robert & Patricia	10050 W Wilshire Yukon, OK
14-387-3020	Torbati, H Massoud & Marjaneh	Box 30584 MWC, OK
14-387-3635		
14-387-3000	Curtic Cecile L	2629 NW 59 OKC, OK
14-387-3010	Nossaman, SL	6425 E Reno MWC, OK

Map 1497

16-850-2325	Nekvapil, Mary & Eddie	6205 S Post Rd MWC, OK
16-850-2326	City of Oklahoma City	

Map 1500

16-850-2375	City of Oklahoma City	

Map 1501

16-850-2475	Corps of Engineers	Box 61 Tulsa, OK 74121

Map 1502

Outside Tinker AFB	Corps of Engineers	Box 61 Tulsa, OK 74121

Map 1503

14-388-9000	City of Oklahoma city	
14-388-9050	Okla City Municipal Improvement Authority	
14-388-8500	United State of America	U.S. District Court Case #6532
14-388-8000	City of Oklahoma City	
16-850-2475	City of Oklahoma City	

Map 1505

16-850-2650		

Map 1508

14-389-2600	Air Refiner Inc	5500 S Hattie OKC, OK
14-389-2575	Oklahoma County	320 Robert S Kerr Room 101 OKC, OK
14-229-2600 Block 002 Lot 1-2	Oklahoma County	320 Robert S Kerr Room 101 OKC, OK
14-229-2700 Block 002 Lot 3-4	Oklahoma County	320 Robert S Kerr Room 101 OKC, OK

14-229-2900 Block 002 Lot 5	Oklahoma County	320 Robert S Kerr Room 101 OKC, OK
14-229-3000 Block 002 Lot 6	Oklahoma County	320 Robert S Kerr Room 101 OKC, OK
14-229-3100 Block 002 Lot 7	Oklahoma County	320 Robert S Kerr Room 101 OKC, OK
14-229-3300 Block 002 Lot 9	Oklahoma County	320 Robert S Kerr Room 101 OKC, OK
14-229-3400 Block 002 Lot 10-11	Oklahoma County	320 Robert S Kerr Room 101 OKC, OK
14-229-3600 Block 002 Lot 12	Oklahoma County	320 Robert S Kerr Room 101 OKC, OK
14-229-3700 Block 002 Lot 13	Oklahoma County	320 Robert S Kerr Room 101 OKC, OK
14-229-3800 Block 002 Lot 14	Oklahoma County	320 Robert S Kerr Room 101 OKC, OK
14-229-0100 Block 001 Lot 1,3,6 Block 002 Lot 8	Oklahoma County	320 Robert S Kerr Room 101 OKC, OK
14-229-0200 Block 001 Lot 2	Oklahoma County	320 Robert S Kerr Room 101 OKC, OK
14-229-0700 Block 001 Lot 7,9,11,14,15,18,19	Oklahoma County	320 Robert S Kerr Room 101 OKC, OK
14-229-1000 Block 001 Lot 10	Oklahoma County	320 Robert S Kerr Room 101 OKC, OK
14-229- Block 001 Lot 22-23	Oklahoma County	320 Robert S Kerr Room 101 OKC, OK

14-229- Block 001 Lot 4	Oklahoma County	320 Robert S Kerr Room 101 OKC, OK

APPENDIX B

PRELIMINARY

IRPIMS Site Codes
Tinker Air Force Base

Code	Area
FT21	Fire Training Area #1
LF11	Landfill #1
LF12	Landfill #2
LF13	Landfill #3
LF14	Landfill #4
LF15	Landfill #5
LF16	Landfill #6
OT01	Bldg. 3001
OT02	Soldier Creek
OT05	Industrial Waste Treatment Plant
PRM	Base Perimeter
ST03	North Tank Area
ST06	Southwest Tank Area
ST07	Fuel Farm
ST08	???
WP17	Supernatant Pond
WP18	Industrial Waste Pit #1
WP19	Industrial Waste Pit #2

Site Code	Well	Aq	East (X)	North (Y)	T.O.C.	Surface Elev.	Total Depth	Top of Screen	Screen Length	Top of Sandpk	Sandpk Length
FT21	61A		2177260.00	152280.00	1219.10	1216.10	17.00				
FT21	61B		2177260.00	152280.00	1219.31	1216.30	66.70				
FT21	62		2177400.00	152720.00	1224.40	1221.40	17.00				
LF11	1		2177767.92	152163.61		1218.77					
LF11	1A				1223.09	1220.09	35.00				
LF11	1B		2177359.67	152163.67		1219.74					
LF11	2		2177767.51	151676.50		1221.87					
LF11	2B										
LF11	9		2177288.26	151866.61		1222.80					
LF11	9B										
LF12	4A						36.50				
LF12	59A		2179076.14	150232.51		1242.77					
LF12	59B		2179072.06	150241.75		1243.11					
LF12	59C		2179067.55	150252.11		1242.68					
LF12	60A		2178187.77	149815.71		1240.43					
LF12	60B		2178195.96	149807.66		1240.29					
LF12	60C		2178204.47	149801.47		1240.32					
LF12	79A										
LF12	79B										
LF12	79C										
LF13	3A		2178221.73	151455.39		1222.81					
LF13	3B		2178221.93	151437.87		1222.95					
LF13	4A		2178594.74	151075.32		1224.61					
LF13	4B		2178605.83	151074.67		1224.55					
LF13	5A										
LF13	5B										
LF13	32B										
LF13	32C										
LF13	76A										
LF13	76B										

PRELIMINARY

Z

Site Code	Well	Aq	East (X)	North (Y)	T.O.C.	Surface Elev.	Total Depth	Top of Screen	Screen Length	Top of Sandpk	Sandpk Length
LF14	75A										
LF14	75B										
LF14	75C										
LF14	78A										
LF14	78B										
LF14	10		2177650.00	150180.00	1256.03	1253.44	75.00				
LF14	10B										
LF14	10C										
LF14	11A										
LF14	11B										
LF14	11C										
LF15	6		2182443.70	149512.10	1242.90	1240.50	27.20				
LF15	6A		2182453.10	149509.60	1243.70	1240.20	67.00				
LF15	7		2182648.10	149182.40	1246.70	1243.70	19.10				
LF15	8		2182920.90	148791.10	1250.50	1247.20	20.20				
LF15	8A		2182930.50	148796.40	1251.10	1248.10	87.00				
LF15	13		2182469.80	148720.40	1255.80	1255.80	55.00				
LF15	13A		2182469.80	148720.40	1258.80	1255.80	87.00				
LF15	58A		2182389.70	148930.00	1257.40	1254.00	97.00				
LF15	58B		2182390.00	148930.00	1257.40	1254.00	37.00				
LF16	12		2189181.59	147631.46	1297.70	1303.60	45.50				
LF16	26		2189682.20	148494.42	1277.73	1274.10	107.00				
LF16	27		2189329.60	148665.26	1281.68	1278.50	45.00				
LF16	28		2189502.69	148815.15	1272.30	1269.40	98.00				
LF16	29		2188908.93	147920.57	1300.00	1297.00	75.00				
LF16	30		2189379.43	148412.76	1282.55	1279.00	25.00				
LF16	31		2189604.98	148178.31	1280.48	1277.90	28.00				
LF16	36		2188916.93	148296.22	1295.60	1292.77	102.90				
LF16	37		2188906.21	147998.69	1299.82	1296.88	41.00				
LF16	38		2189273.90	147629.68	1303.67	1300.50	119.30				
LF16	39		2189603.83	147728.88	1290.66	1287.74	27.00				

PRELIMINARY

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Site Code	Well	Aq	East (X)	North (Y)	T.O.C.	Surface Elev.	Total Depth	Top of Screen	Screen Length	Top of Sandpk	Sandpk Length
LF16	53				1280.43						
LF16	54	P	2190247.30	148384.30	?1295.1	1295.10	27.50	17.0	10.0		
LF16	55A		2190028.67	147639.99	1296.30	1291.90	118.00				
LF16	55B		2190013.81	147640.95	1296.13	1291.80	35.10				
LF16	55C		2190005.57	147640.91	1294.66	1291.40	77.40				
LF16	56A		2190200.34	147648.44	1301.57	1298.60	87.60				
LF16	56B		2190209.67	147651.77	1302.26	1299.00	37.60				
LF16	57A		2190236.90	147999.50	?1301.2	1293.10	117.80	107.3	10.0	99.7	20.3
LF16	57B		2189540.43	148387.91		1280.70					
LF16	63A		2188306.23	148302.52	1278.51	1275.51	92.00	80.0	10.0	71.0	47.0
LF16	63B		2188304.55	148288.25	1278.21	1275.10	28.00	18.0	10.0	16.0	19.0
LF16	64A		2188454.27	147671.66		1284.84					
LF16	64B		2188452.61	147687.29	1287.67		42.00	29.0	10.0	17.0	18.0
LF16	65A		2188576.15	147288.98		1293.13					
LF16	65B		2188562.21	147290.31	1295.83	1292.50	47.60	37.0	10.0	20.0	27.0
LF16	66A		2188981.75	147133.04		1290.20					
LF16	66B		2188980.73	147146.21	1293.53	1290.70	46.50	36.0	10.0	12.0	35.0
LF16	67A		2189476.21	147041.54		1293.50					
LF16	67B		2189488.41	147043.28		1294.10					
OT01	1-1A	T	2186012.42	155964.54	1275.42	1273.30	98.00	88.0	10.0	75.0	25.9
OT01	1-1B	P	2186012.43	155964.55	1275.15	1273.30	33.00	23.0	10.0	12.0	23.0
OT01	1-2A	T	2185798.59	154048.80	1278.43	1275.70	100.50	90.5	10.0	81.0	21.5
OT01	1-2B	P	2185809.97	154058.68	1275.58	1275.70	33.00	23.0	10.0	15.0	20.0
OT01	1-3A	T	2185812.56	153226.92	1278.53	1276.20	118.00	108.0	10.0	88.0	32.0
OT01	1-3B	P	2185813.29	153214.48	1278.55	1276.60	33.00	23.0	10.0	10.0	25.0
OT01	1-4A	T	2185815.02	152598.84	1278.84	1275.50	116.70	106.7	10.0	108.0	12.0
OT01	1-4B	P	2185814.88	152588.19	1278.94	1275.70	32.80	22.8	10.0	10.0	25.0
OT01	1-5A	T	2185609.97	153436.43	1279.72	1275.10	116.40	106.4	10.0	80.0	50.0
OT01	1-5B	P	2185598.73	153435.80	1279.60	1276.00	32.40	22.4	10.0	10.0	25.0
OT01	1-6A	T	2185399.21	152777.10	1278.38	1274.70	116.30	106.3	10.0	83.0	37.0
OT01	1-6B	P	2185388.43	152776.59	1278.31	1275.20	31.90	21.8	10.1	10.0	25.0

PRELIMINARY

Site Code	Well	Aq	East (X)	North (Y)	T.O.C.	Surface Elev.	Total Depth	Top of Screen	Screen Length	Top of Sandpk	Sandpk Length
OT01	1-7A	T	2184906.84	154602.89	1275.70	1272.70	107.00	97.0	10.0	95.0	25.0
OT01	1-7B	P	2184919.21	154604.32	1275.77	1272.60	31.80	21.8	10.0	10.0	25.0
OT01	1-8A	T	2184963.26	155060.56	1277.33	1273.50	116.20	106.2	10.0	100.0	20.0
OT01	1-8B	P	2184964.48	155051.38	1277.08	1273.70	31.80	21.8	10.0	10.0	25.0
OT01	1-9A	T	2184947.27	155978.20	1275.38	1271.20	120.00	110.0	10.0	87.0	35.0
OT01	1-9B	P	2184946.75	155967.70	1275.55	1271.20	33.00	23.0	10.0	10.0	25.0
OT01	1-10A	T	2185404.36	156322.71	1272.92	1268.90	98.00	88.0	10.0	72.0	28.5
OT01	1-10B	P	2185419.66	156325.48	1271.96	1268.90	33.50	23.5	10.0	10.0	25.5
OT01	1-10C	R	2185389.08	156324.48	1271.85	1268.90	142.60	112.6	9.5	97.0	54.3
			*** TWO WELL SCREENS ***					133.1	9.0		
OT01	1-11A	T	2186489.07	156129.73	1270.52	1268.20	98.00	88.0	10.0	81.0	19.0
OT01	1-11B	P	2186488.22	156155.05	1270.72	1268.20	33.50	23.5	10.0	10.0	15.5
OT01	1-11C	R	2186491.74	156107.06	1271.84	1268.81		112.0	10.0	110.0	12.0
OT01	1-12A	T	2184495.00	155895.00	1265.69	1262.90	97.30	87.3	10.0	49.0	51.0
OT01	1-12B	P	2184498.00	155882.00	1265.57	1262.50	37.00	27.0	10.0	10.0	30.0
OT01	1-12C	R	2184500.00	155902.00	1265.89	1262.80	153.00	143.0	10.0	110.0	45.0
OT01	1-13A	T	2184500.00	155085.00	1268.38	1265.50	77.10	67.1	10.0	41.0	39.0
OT01	1-13B	P	2184500.00	155072.00	1268.26	1265.40	27.10	17.1	10.0	9.0	21.0
OT01	1-13C	R	2184500.00	155095.00	1268.17	1265.30	147.00	137.1	10.0	100.0	50.0
OT01	1-14A	T	2184506.00	154410.00	1269.71	1266.70	99.00	89.0	10.0	50.5	48.9
OT01	1-14B	P	2184506.00	154400.00	1269.74	1266.70	33.00	28.0	5.0	13.7	21.3
OT01	1-14C	R	2184506.00	154420.00	1269.70	1266.70	140.10	121.1	19.0	120.0	29.5
OT01	1-15A	T	2186012.00	155130.00	1277.50	1274.50	97.00	87.0	10.0	40.0	60.0
OT01	1-15B	P	2186012.00	155119.00	1277.70	1274.50	27.00	17.0	10.0	10.0	20.0
OT01	1-15C	R	2186012.00	155140.00	1277.50	1274.50	156.00	137.0	10.0	124.0	26.0
OT01	1-28A	T	2183786.00	155841.00	1262.50	1259.50	85.00	55.0	10.0	38.7	61.3
			*** TWO WELL SCREENS ***					75.0	10.0		
OT01	1-28B	P	2183786.00	155841.00	1262.50	1259.50	30.00	20.0	10.0	8.0	22.0
OT01	1-29	P	2183884.00	156293.00	1260.90	1257.90	30.00	20.0	10.0	8.0	22.0

PRELIMINARY

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Site Code	Well	Aq	East (X)	North (Y)	T.O.C.	Surface Elev.	Total Depth	Top of Screen	Screen Length	Top of Sandpk	Sandpk Length
OT01	1-45A	T	2184515.00	153235.00	1271.20	1268.00	99.80	89.8	10.0	57.0	50.0
OT01	1-45B	P	2184515.00	153225.00	1271.10	1268.00	31.90	21.9	10.0	9.0	28.0
OT01	1-45C	R	2184515.00	153245.00	1271.20	1268.00	149.80	119.8	10.0	117.0	40.0
			*** TWO WELL SCREENS ***					139.8	10.0		
OT01	1-54A	T						79.0	10.0	78.0	11.4
OT01	1-54B	P						22.6	10.0	19.5	13.5
OT01	1-54C	UR						112.0	10.0	108.0	41.0
			*** TWO WELL SCREENS ***					132.0	10.0		
OT01	1-55A	T						83.0	10.0	81.0	12.5
OT01	1-55B	P									
OT01	1-55C	UR						111.5	121.5	118.0	24.0
			*** TWO WELL SCREENS ***					131.5	141.5		
OT01	1-56A	T						80.0	90.0	78.0	15.0
OT01	1-56B	P						23.0	10.0	22.0	13.0
OT01	1-56C	UR						107.4	10.0	107.0	40.0
			*** TWO WELL SCREENS ***					127.4	10.0		
OT01	1-57A	T						81.0	10.0	79.2	20.8
OT01	1-57B	P						19.4	10.0	20.0	15.0
OT01	1-57C	UR						110.0	10.0	108.0	33.5
			*** TWO WELL SCREENS ***					130.0	10.0		
OT01	1-58A	T	2184866.00	154700.00	1275.20		95.00	80.0	15.0	80.0	25.0
OT01	1-58B	P	2184866.00	154700.00	1275.20		37.00	22.0	15.0	22.0	21.0
OT01	1-58C	UR	2184866.00	154700.00	1275.60		130.00	110.0	20.0	109.5	35.5
OT01	1-59A	T	2186669.65	156313.42	1267.13	1267.13		50.0	10.0	47.4	17.6
OT01	1-59B	P			1267.20	1270.00		?11.00	10.0		
OT01	1-59C	R	2186656.88	156313.43	1267.39	1267.39		115.0	10.0	106.0	25.5
OT01	1-60A	T	2186165.38	156317.48	1271.06	1270.89		0.0	10.0	52.0	17.0
OT01	1-60B	P	2186147.83	156316.36	1271.13	1271.03		12.4	10.0	10.0	17.4
OT01	1-60C	R	2186175.48	156313.51	1271.06	1271.05		113.5	10.0	106.0	22.5
OT01	19A	T	2186484.00	155300.70	1271.38	1268.40	82.00	72.0	10.0	62.0	20.0
OT01	19B	P	2186484.64	155320.40	1270.69	1267.70	33.50	23.5	10.0	12.0	23.5
OT01	19C	R	2186487.61	155333.65	1270.45	1267.48		107.0	10.0	105.0	12.0

PRELIMINARY

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Site Code	Well	Aq	East (X)	North (Y)	T.O.C.	Surface Elev.	Total Depth	Top of Screen	Screen Length	Top of Sandpk	Sandpk Length
OT01	20A	T	2186489.86	154427.52	1271.61	1268.60	90.00	80.0	10.0	75.0	15.0
OT01	20B	P	2186492.88	154398.86	1272.07	1269.10	33.00	23.0	10.0	15.0	20.0
OT01	21A	T	2186498.45	153841.11	1271.25	1269.00	90.00	80.0	10.0	61.0	29.0
OT01	21B	P	2186499.56	153809.67	1270.85	1269.00	33.40	23.4	10.0	12.0	23.4
OT01	22A	T	2187384.80	155259.30	1256.10	1252.50	57.00	47.0	10.0	41.0	16.0
OT01	22B	P	2187439.20	155898.30	1254.93	1252.50	33.50	23.5	10.0	10.0	25.5
OT01	22D	T	2187363.42	155255.43	1254.93	1254.93	68.00	72.0	10.0	68.0	35.0
OT01	22E	R	2187384.00	155290.00	1254.93	1252.50	141.00	122.0	10.0	115.0	35.0
OT01	22F										
OT01	23A	T	2187392.92	153935.21	1270.20	1285.00	115.00	105.0	10.0	99.0	16.0
OT01	23B	P	2187372.26	153937.59	?1267.5	1285.00	33.00	23.0	10.0		
OT01	24A	T	2187442.74	152757.92	?1286.42	1285.00	102.00	92.0	10.0	89.0	13.0
OT01	24B	P	2187442.64	152739.93	1287.16	1285.00	33.00	23.0	10.0	10.0	25.0
OT01	24C	R	2187442.64	152739.93	?1286.2	1283.20					
OT01	M-1C		2183689.00	156157.00		1255.00		115.0	15.0	113.0	17.0
OT01	M-2C		2183784.00	155162.00		1260.00		110.0	15.0	108.0	17.0
OT01	M-3C		2183784.00	154162.00		1262.00		121.0	15.0	119.0	17.0
OT01	M-4C		2183784.00	153422.00		1262.00					
OT01	R-1		2184890.00	155850.00		1270.00		128.0	30.0	126.0	37.0
OT01	R-2		2184890.00	155350.00		1272.00		129.0	35.0	127.0	42.0
OT01	R-3		2184890.00	154800.00		1272.00		110.0	35.0	108.0	42.0
OT01	R-4		2184890.00	154275.00		1273.00		112.0	40.0	110.0	47.0
OT01	R-5		2184890.00	153725.00		1274.00		112.0	25.0	110.0	32.0
OT01	R-6		2184890.00	153200.00		1274.00		112.0	35.0		
OT01S	32A	P	2185192.00	155052.00	1275.25	1276.00	31.60	20.6	11.0	9.0	25.6
OT01S	32B	T	2185185.00	155052.00	1275.23	1276.00	91.60	80.6	11.0	60.0	35.5
OT01S	32C	R	2185178.00	155052.00	1275.12	1276.00	141.20	130.2	11.0	102.0	47.0
OT01S	33A	P	2185100.00	155668.00	1274.96	1276.00	31.90	21.9	10.0	12.5	24.3
OT01S	33B	T	2185092.00	155668.00	1274.97	1276.00	91.10	80.1	10.0	62.0	34.8
OT01S	33C	R	2185085.00	155665.00	1274.99	1276.00	141.10	130.1	11.0	105.0	44.6

PRELIMINARY

Site Code	Well	Aq	East (X)	North (Y)	T.O.C.	Surface Elev.	Total Depth	Top of Screen	Screen Length	Top of Sandpk	Sandpk Length
OT01S	34A	P	2185726.00	154991.00	1275.10	1275.13	31.10	20.1	11.0	10.0	25.0
OT01S	34B	T	2185726.00	154998.00	1275.12	1275.13	90.60	80.6	10.0	64.0	31.0
OT01S	34C	R	2185726.00	155006.00	1275.11	1275.13	140.20	130.2	10.0	110.0	36.0
OT01S	34D	LR	2185726.00	155066.00	1275.12	1276.00	253.10	218.0	10.0	201.0	57.3
			*** TWO WELL SCREENS ***					243.1	10.0		
OT01S	35A	P	2185726.00	154991.00	1275.13	1275.09	30.20	20.2	10.0	12.0	23.0
OT01S	35B	T	2185725.00	155421.00	1275.10	1275.09	90.20	80.2	10.0	62.0	33.0
OT01S	35C	R	2185725.00	155428.00	1275.11	1275.09	130.20	120.2	10.0	106.0	33.3
OT02	1-36	P	218659.00	155198.00	1270.70	1267.70	57.50	54.5	3.0	47.0	10.5
OT02	1-37	P	2186710.00	155199.00	1259.90	1259.90	16.00	6.0	10.0	5.0	11.0
OT02	1-38	P	2186825.00	155199.00	1255.80	1252.80	39.40	36.4	3.0	31.7	8.9
OT02	1-39	P	2186955.00	155200.00	1242.20	1239.20	17.90	14.9	3.0	12.0	7.0
OT02	1-40	P	2187085.00	155200.00	1237.50	1234.50	12.30	9.3	3.0	6.0	6.3
OT02	1-41	P	2187165.00	155201.00	1247.60	1244.60	23.20	20.2	3.0	9.4	17.1
OT02	1-42	P	2187265.00	155201.00	1252.90	1249.90	26.70	23.7	3.0	16.0	10.1
OT02	1-43A	P	2186750.00	153916.00	1267.40	1264.40	30.70	25.7	5.0	16.0	14.7
OT02	1-43B	P	2186750.00	153916.00	1267.40	1264.40	12.20	7.2	5.0	7.0	5.2
OT02	1-44A	?	2186972.00	153991.00	1245.30	1242.30	41.40	36.4	5.0	25.0	17.0
OT02	1-44B	P	2186972.00	153981.00	1245.30	1242.30	21.80	16.8	5.0	16.0	13.0
OT05	1-49A	T	2186838.08	155923.85	1254.67	1251.60	57.00	47.0	10.0	47.0	26.1
OT05	1-49B	P	2186802.34	155927.08	1257.78	1254.70	37.00	27.0	10.0	27.0	11.0
OT05	1-49C	R	2186803.76	155912.39	1257.45	1254.60	117.00	107.0	10.0	105.0	20.0
OT05	1-50A	T	2186920.77	155559.91	1247.49	1245.60	64.70	54.7	10.0	53.8	20.2
OT05	1-50B	P	2186909.04	155560.35	1247.96	1245.10	41.50	31.5	10.0	31.2	13.8
OT05	1-50C	R	2186898.34	155560.23	1248.97	1245.90	107.00	97.0	10.0	95.0	28.0
OT05	1-50D	LR	2186925.34	155551.79	1246.98	1244.03	247.00	237.0	10.0	235.0	20.0
OT05	1-51A	T	2187184.38	155795.46	1243.31	1240.30	61.20	51.2	10.0	55.0	13.0
OT05	1-51B	P	2187184.60	155777.21	1242.61	1240.40	23.40	13.4	10.0	13.0	15.0
OT05	1-51C	R	2187184.89	155785.35	1243.13	1240.30	89.00	79.0	10.0	77.0	33.0
OT05	1-52A	T	2187439.59	155994.83	1236.39	1233.36	59.90	49.9	10.0	49.0	21.0
OT05	1-52B	P	2187442.82	155984.27	1236.95	1234.09	18.40	8.4	10.0	7.3	13.7
OT05	1-52C	R	2187443.08	156004.01	1237.01	1234.10		97.0	10.0	95.0	12.0

PRELIMINARY

Site Code	Well	Aq	East (X)	North (Y)	T.O.C.	Surface Elev.	Total Depth	Top of Screen	Screen Length	Top of Sandpk	Sandpk Length
OT05	1-53A	T	2187197.13	156314.14	1250.15	1247.57	59.50	49.5	10.0	49.0	19.0
OT05	1-53B	P	2187180.20	156314.32	1251.52	1248.51	28.00	18.0	10.0	16.5	14.1
OT05	1-53C	R	2187189.16	156312.60	1251.28	1249.29		97.0	10.0	95.0	12.0
PRM	40A		2171919.10	157962.50	1217.80	1214.80	150.00	140.0	10.0	136.0	19.0
PRM	40B				1217.50	1215.10	97.60	87.6	10.0	45.0	55.0
PRM	40C	P			1217.80	1214.80	47.00	37.0	10.0	5.0	42.0
PRM	41A		2171980.60	155256.40	1224.50	1222.10	149.60	69.6	10.0	36.0	114.0
			*** THREE WELL SCREENS ***					119.6	5		
								144.6	5		
PRM	41B	P			1224.60	1222.30	29.70	19.7	10.0	10.0	20.0
PRM	42A		2171952.30	152430.70	1223.10	1220.30	147.20	47.2	5.0	45.0	105.0
			*** THREE WELL SCREENS ***					112.2	5		
								137.2	10		
PRM	42B	P			1223.10	1220.30	39.20	29.2	10.0	10.0	20.0
PRM	43A		2174544.10	151089.10	1232.00	1229.60	149.60	49.6	10.0	35.0	115.0
			*** THREE WELL SCREENS ***					129.6	5		
								144.6	5		
PRM	43B	P			1231.00	1229.00	27.60	17.6	10.0	10.0	20.0
PRM	45A		2177224.00	148855.00	1269.00	1266.50	145.00	105.0	5.0	51.0	107.5
			*** TWO WELL SCREENS ***					140	5		
PRM	45B	P			1268.70	1265.70	42.00	32.0	10.0	10.0	36.0
PRM	46A		2177192.90	149897.30	1257.70	1255.20	152.00	72.0	5.0	67.0	94.0
			*** THREE WELL SCREENS ***					117	10		
								147	5		
PRM	46B	P			1258.00	1255.00	47.00	37.0	10.0	10.0	40.0
PRM	47A		2178843.60	148504.50	1250.90	1248.40	147.00	87.0	5.0	32.0	127.5
			*** TWO WELL SCREENS ***					142	5		
PRM	47B	P			1251.50	1248.50	37.00	27.0	10.0	8.0	32.0
PRM	48A		2180961.40	148510.30	1248.90	1246.40	147.00	82.0	5.0	37.0	122.5
			*** TWO WELL SCREENS ***					142	147		
PRM	48B	P			1249.20	1246.20	37.00	27.0	10.0	10.0	30.0

PRELIMINARY

Site Code	Well	Aq	East (X)	North (Y)	T.O.C.	Surface Elev.	Total Depth	Top of Screen	Screen Length	Top of Sandpk	Sandpk Length
PRM	49A		2182486.30	146233.80	1283.20	1280.70	147.00	112.0	5.0	42.0	117.5
			*** TWO WELL SCREENS ***					142	5		
PRM	49B	P			1282.60	1279.60	37.00	27.0	10.0	10.0	35.0
PRM	50A		2184014.30	144158.50	1252.70	1250.20	147.00	97.0	5.0	43.0	116.5
			*** TWO WELL SCREENS ***					142	5		
PRM	50B	P			1252.80	1249.80	32.00	22.0	10.0	10.0	35.0
PRM	51A		2182821.50	158648.80	1260.10	1257.60	147.00	87.0	5.0	36.0	123.5
			*** TWO WELL SCREENS ***					142	5		
PRM	51B	P			1258.90	1255.90	37.00	27.0	10.0	10.0	30.0
PRM	52A		2177009.20	158045.30	1218.30	1215.80	150.00	140.0	10.0	32.0	128.0
PRM	52B	P			1218.30	1215.80	32.00	22.0	10.0	10.0	25.0
PRM	68	P	2173655.55	158797.82	1192.50	1189.30	20.60	18.6	10.0	4.5	16.6
PRM	69	P	2174749.50	158795.70	1198.90	1195.90	23.20	13.2	10.0	11.0	14.0
PRM	70	P	2180809.30	158485.40	1246.10	1243.30	28.40	18.0	10.4	5.5	29.5
PRM	71	P	2185396.68	158402.47	1236.50	1233.50	23.00	13.0	10.0	10.0	15.0
PRM	72	P	2187439.20	155898.30	1232.20	1229.30	15.10	5.1	10.0	3.9	12.6
PRM	73		2187384.50	149487.90	1298.20	1295.20	52.00	42.0	10.0	19.5	41.5
PRM	74A		2186702.70	144964.40	1257.70	1254.70	152.60	59.4	10.0	47.6	120.4
			*** THREE WELL SCREENS ***					98.6	2.4		
								142.2	10.4		
PRM	74B	P			1257.30	1254.30	28.00	18.0	10.0	5.0	25.0
ST03	1-26	P	2185152	156053	1275.20	1272	16.80	6.8	10	4	13
ST03	1-27	P	2185218	156112	1276.20	1273	23.80	13.8	10	8	16
ST03	1-30	P	2185148.37	156117.71	1274.30	1272.00	28.00	18.0	10.0	17.2	18.6
ST03	1-31	P	2185120.00	156170.00		1271.00	20.10	10.1	10.0	4.0	16.5
ST03	1-32	P	2185291.37	156002.71	1277.00	1274.00	15.00	5.0	10.0	5.0	10.0
ST03	MM-1	P	2185166.08	156011.92	1272.59	1273.00	33.00	13.0	10.0	8.0	15.0
ST03	MM-2	P	2185195.93	156059.15	1273.20	1274.00	25.00	15.0	10.0	12.0	13.0
ST03	MM-3	P	2185144.55	156105.08	1272.21	1273.00	26.50	16.5	10.0	16.0	10.0

PRELIMINARY

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Site Code	Well	Aq	East (X)	North (Y)	T.O.C.	Surface Elev.	Total Depth	Top of Screen	Screen Length	Top of Sandpk	Sandpk Length
ST06	1-16	P	2184780.00	153050.00	1273.80	1271.00	25.00	15.0	10.0	11.7	13.3
ST06	1-17	P	2184760.00	153575.00	1271.00	1268.00	17.00	7.0	10.0	5.0	17.0
ST06	1-18	P	2184917.00	153685.00	1277.80	1274.70	19.90	9.9	10.0	4.5	20.5
ST06	25A	T	2184940.59	153419.82	1277.77	1275.20	90.00	80.0	10.0	76.0	14.0
ST06	25B	P	2184900.86	153496.74	1274.78	1275.20	25.00	15.0	10.0	9.0	21.0
ST06	25C	R	2184940.59	153429.82	1277.90	1275.00	147.00	122.9	9.0	120.0	29.6
			*** TWO WELL SCREENS ***					138.0	9.0		
ST06	OLD M-1	P	2184929.78	153574.47	1276.61	1275.00	20.00	10.0	10.0	9.0	21.0
ST06	OLD M-2	P	2184789.99	153276.87	1269.40	1269.00	20.00	10.0	10.0	9.0	16.0
ST06	OLD M-3	P	2184873.46	153365.35	1274.72	1273.00	25.00	15.0	10.0	9.0	21.0
ST06	OLD M-4	P	2184900.86	153496.74	1274.78	?1273.20		15.0	10.0	8.0	22.0
ST06	OLD M-5	P	2184976.79	153514.86	1274.82	1274.00	20.00	10.0	10.0	8.0	22.0
ST06	OLD M-6	P	2185018.97	153550.93	1276.55	1276.00	27.00	17.0	10.0	14.0	20.0
ST06	OLD M-7	P	2185097.50	153589.83	1276.05	1275.00	25.00	15.0	10.0	13.0	12.0
ST07	MF-1A		2182129.90	157040.10	1252.40	1249.40		47.0	10.0	45.0	60.0
			*** TWO WELL SCREENS ***					97.0	5.0		
ST07	MF-1B	P	2182130.30	157048.05	1251.90	1249.40		22.5	5.0	21.5	15.0
			*** TWO WELL SCREENS ***					30.0	5.0		
ST07	MF-1C	P	2182140.00	157090.00	1249.40	1249.40	22.00	12.0	10.0	9.0	13.0
ST07	MF-2	P	2182290.00	157150.00	1249.80	1249.80	21.00	12.0	10.0	10.0	12.0
ST07	MF-3	P	2182460.00	157150.00	1251.50	1251.50	20.00	10.0	10.0	8.0	12.0
ST07	MF-4	P	2182390.00	157140.00	1251.10	1251.10	20.00	10.0	10.0	9.0	11.0
ST07	MF-6	P	2182130.00	157100.00	1253.80	1253.80	35.00	25.0	10.0	20.0	15.0
ST07	MF-7	P	2182260.00	157070.00	1250.70	1250.70	20.00	10.0	10.0	9.0	11.0
ST07	MF-8	P	2182450.00	157050.00	1252.80	1252.80	20.00	10.0	10.0	9.0	11.0
ST07	MF-10	P	2182360.00	157050.00	1251.80	1251.80	20.00	10.0	10.0	9.0	11.0
ST07	MF-11	P	2182560.00	157070.00	1253.80	1253.80	20.00	10.0	10.0	8.0	12.0
ST07	MF-12	P	2182540.00	157140.00	1252.00	1252.00	20.00	10.0	10.0	8.0	12.0
ST07	MF-13	P	2182710.00	157180.00	1251.10	1251.10	24.00	14.0	10.0	12.0	15.0
ST07	MF-14	P	2182420.00	157280.00	1250.70	1250.70	25.00	15.0	10.0	12.5	12.5

PRELIMINARY

Site Code	Well	Aq	East (X)	North (Y)	T O C	Surface Elev.	Total Depth	Top of Screen	Screen Length	Top of Sandpk	Sandpk Length
ST07	MF-15A		2182607.10	157229.40	1254.90	1252.00		45.0	10.0	44.0	56.0
			*** TWO WELL SCREENS ***					95.0	5.0		
ST07	MF-15B	P	2182618.30	157230.50	1255.00	1252.00		22.0	10.0	10.0	25.0
ST07	MF-15C	P	2182612.70	157230.20	1255.00	1252.00		5.0	5.0	5.0	16.0
			*** TWO WELL SCREENS ***					15.0	5.0		
ST07	MF-16A		2182711.80	157015.70	1257.30	1254.30		50.0	10.0	45.0	55.0
			*** TWO WELL SCREENS ***					90.0	10.0		
ST07	MF-16B	P	2182712.70	157257.20	1257.30	1254.30		27.0	5.0	10.0	25.0
ST07	MF-17A	P	2182381.60	156914.70	1255.30	1252.30		47.5	10.0	40.0	60.0
			*** TWO WELL SCREENS ***					94.5	5.0		
ST07	MF-17B	P	2182386.60	156914.90	1254.80	1252.30		7.5	5.0	6.5	14.5
			*** TWO WELL SCREENS ***					15.0	5.0		
ST07	MF-18	P	2182274.80	157099.60	1252.30	1249.80		7.5	5.0	6.0	15.0
			*** TWO WELL SCREENS ***					15.0	5.5		
ST07	MF-19	P	2182342.60	157100.20	1252.70	1250.20		5.0	5.0	4.0	17.0
			*** TWO WELL SCREENS ***					15.0	5.0		
ST07	MF-20	P	2182341.70	157145.00	1252.60	1250.10		7.5	5.0	6.0	15.0
			*** TWO WELL SCREENS ***					15.0	5.0		
ST07	MF-22	P	2182417.90	157213.20	1253.10	1250.60		7.5	5.0	6.0	15.0
			*** TWO WELL SCREENS ***					15.0	5.0		
ST07	MF-23	P	2182576.60	157147.00	1254.50	1252.00		7.5	5.0	6.0	15.0
			*** TWO WELL SCREENS ***					15.0	5.0		
ST07	MF-24		2182456.00	157098.00	1254.70	1251.70	20.00	4.1	15.9	2.0	20.0
ST07	MF-26		2182441.00	157098.00	1251.70	1251.70	26.00	4.4	14.0	3.0	17.4
TOB	TOB-1A	P	2185561.40	156741.60	1264.80	1262.30		75.0	10.0	71.0	18.5
TOB	TOB-1B	P	2185535.30	156740.90	1264.80	1262.30		10.0	10.0	6.5	15.5
TOB	TOB-1C	R	2185516.50	156741.70	1265.20	1262.30		140.0	10.0	137.0	16.0
TOB	TOB-2A	T	2185554.60	158359.70	1234.70	1231.70		73.0	10.0	66.5	18.5
TOB	TOB-2B	P	2185570.10	158361.50	1234.40	1231.50		25.0	10.0	23.0	15.0
TOB	TOB-2C	R	2185537.50	158357.70	1234.50	1231.60		130.0	10.0	72.0	74.0

PRELIMINARY

Site Code	Well	Aq	East (X)	North (Y)	T.O.C.	Surface Elev.	Total Depth	Top of Screen	Screen Length	Top of Sandpk	Sandpk Length
TOB	TOB-3A	T	2185667.60	157053.10	1254.30	1254.60		75.0	10.0	70.3	16.7
TOB	TOB-3B	P	2185656.90	157053.00	1254.40	1254.60		18.0	10.0	15.0	14.5
TOB	TOB-3C	R	2185678.20	157053.50	1254.30	1254.50		140.0	10.0	137.0	16.0
TOB	TOB-4A	T	2186070.30	157733.90	1266.00	1266.20		75.0	10.0	71.0	15.0
TOB	TOB-4B	P	2186070.00	156624.00	1266.10	1266.30		20.0	10.0	10.5	21.5
TOB	TOB-4C	R	2186070.90	156642.20	1265.90	1266.10		140.0	10.0	136.0	17.0
TOB	TOB-5A	T	2185761.20	156467.00	1266.80	1266.90		80.0	10.0	73.8	17.5
TOB	TOB-5B	P	2185748.40	156467.00	1266.90	1266.80		14.0	10.0	11.0	14.5
TOB	TOB-5C	R	2185772.80	156467.10	1266.70	1266.80		142.0	10.0	132.0	33.3
TOB	TOB-6A	T	2186474.40	156583.40	1272.00	1271.90		70.0	10.0	60.0	22.0
TOB	TOB-6B	P	2186476.60	156593.50	1272.20	1272.20		26.0	10.0	23.0	15.0
TOB	TOB-6C	R	2186472.90	156575.40	1272.00	1271.90		125.0	10.0	122.0	19.0
TOB	TOB-7A	T	2186746.30	156933.40	1277.30	1277.70		73.0	10.0	60.0	25.0
TOB	TOB-7B	P	2186731.10	156933.20	1277.10	1277.40		19.0	10.0	15.0	15.0
TOB	TOB-7C	R	2186714.70	156932.70	1276.80	1277.10		129.0	10.0	78.0	63.5
TOB	TOB-8A	T	2186720.80	157474.40	1274.20	1271.40		67.0	10.0	64.0	13.5
TOB	TOB-8B	P	2186720.70	157463.20	1274.60	1271.70		10.0	10.0	7.5	14.0
TOB	TOB-8C	R	2186721.50	157483.60	1274.40	1271.50		134.0	10.0	114.0	37.0
TOB	TOB-9A	T	2187332.40	157036.20	1270.40	1270.50		86.0	10.0	82.0	14.5
TOB	TOB-9B	P	2187330.20	157001.00	1269.30	1269.20		20.0	10.0	9.5	26.5
TOB	TOB-9C	R	2187332.80	157017.50	1269.60	1269.80		131.0	10.0	122.0	20.3
TOB	TOB-10A	T	2186700.00	156500.00	1270.00	?1270.00		70.0	10.0	62.0	19.0
TOB	TOB-10B	P	2186700.00	156500.00	1272.00	1270.00		17.2	10.0	12.0	15.2
TOB	TOB-10C	R	2186700.00	156500.00	1272.00	1270.00		141.0	10.0	126.0	25.0
TOB	TOB-11A	T	2188038.70	155967.00	1233.70	1233.90		64.0	10.0	58.0	18.5
TOB	TOB-11B	P	2188053.00	155969.00	1233.50	1233.70		9.0	10.0	6.0	13.5
TOB	TOB-11C	R	2188025.60	155965.30	1234.10	1234.20		140.0	10.0	130.0	21.0
TOB	TOB-12A	T	2188461.90	157263.30	1230.90	1230.80		78.0	10.0	71.0	18.5
TOB	TOB-12B	P	2188476.10	157257.90	1230.50	1230.50		25.0	10.0	20.5	15.0
TOB	TOB-12C	R	2188489.90	157252.70	1230.40	1230.30		126.0	10.0	101.0	40.0

PRELIMINARY

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Site Code	Well	Aq	East (X)	North (Y)	T.O.C.	Surface Elev.	Total Depth	Top of Screen	Screen Length	Top of Sandpk	Sandpk Length
TOB	TOB-13A	T	2187916.80	158100.90	1256.30	1257.00		75.0	10.0	71.0	16.0
TOB	TOB-13B	P	2187877.00	158143.30	1258.50	1258.50		57.0	10.0	55.0	13.0
TOB	TOB-13C	R	2187900.40	158119.50	1257.40	1257.90		135.0	10.0	131.0	19.0
TOB	TOB-14A	T	2189432.50	158882.90	1223.00	1222.90		86.0	10.0	78.0	18.5
TOB	TOB-14B	P	2189435.80	158903.10	1223.40	1223.40		15.0	10.0	9.5	19.5
TOB	TOB-14C	R	2189430.10	158865.20	1222.80	1222.60		139.0	10.0	135.0	14.5
TOB	TOB-15A	T	2187992.10	159189.90	1243.20	1243.20		71.0	10.0	69.5	18.0
TOB	TOB-15B	P	2187992.80	159162.20	1243.10	1243.60		33.0	10.0	27.5	17.5
TOB	TOB-15C	R	2187992.10	159176.70	1243.10	1243.40		131.0	10.0	90.0	61.0
TOB	TOB-16A	T	2188449.30	159234.40	1235.30	1235.40		75.0	10.0	66.0	20.0
TOB	TOB-16B	P	2188434.60	159234.60	1235.50	1235.70		35.0	10.0	29.0	17.0
TOB	TOB-16C	R	2188449.10	159218.20	1235.50	1235.70		131.0	10.0	120.0	26.9
TOB	TOB-17A	T	2188316.30	155638.30	1234.00	1234.20		79.0	10.0	76.5	13.5
TOB	TOB-17B	P	2188332.20	155639.20	1234.20	1234.30		25.0	10.0	16.0	20.0
TOB	TOB-17C	R	2188304.80	155638.10	1233.20	1234.20		137.0	10.0	133.0	17.0
TOB	TOB-18A	T	2188274.40	154529.70	1243.70	1243.90		75.0	10.0	72.0	23.0
TOB	TOB-18B	P	2188273.50	154538.60	1243.80	1243.70		38.0	10.0	35.0	15.0
TOB	TOB-18C	R	2188275.30	154519.80	1244.00	1243.90		124.0	10.0	114.0	26.0
TOB	TOB-19A	T	2188220.10	153846.20	1255.20	1255.50		77.0	10.0	73.3	18.9
TOB	TOB-19B	P	2188219.60	153855.60	1254.90	1255.10		40.0	10.0	36.5	16.5
TOB	TOB-19C	R	2188220.00	153838.30	1255.70	1255.60		120.0	10.0	115.0	25.0
TOB	TOB-20A	T	2188473.90	156627.30	1232.40	1232.20		76.0	10.0	71.5	18.0
TOB	TOB-20B	P	2188471.40	156615.80	1231.80	1232.20		33.0	10.0	30.0	19.7
TOB	TOB-20C	R	2188476.50	156636.70	1232.20	1232.10		138.0	10.0	130.0	19.0
TOB	TOB-21A	T	2191128.10	149356.60	1270.10	1270.30		92.0	102.0	86.5	17.5
TOB	TOB-21B	P	2191146.00	149351.20	1270.30	1270.30		45.0	10.0	42.0	14.0
TOB	TOB-21C	R	2191136.60	149354.20	1270.40	1270.40		145.0	10.0	139.0	18.0
TOB	TOB-22A	T	2190708.90	150991.20	1265.90	1266.10		86.0	10.0	82.0	19.0
TOB	TOB-22B	P	2190711.30	150983.00	1266.10	1266.30		30.0	10.0	25.0	16.0
TOB	TOB-22C	R	2190707.30	151000.20	1266.00	1265.90		130.0	10.0	125.0	25.0

PRELIMINARY

Site Code	Well	Aq	East (X)	North (Y)	T.O.C.	Surface Elev.	Total Depth	Top of Screen	Screen Length	Top of Sandpk	Sandpk Length
WP18	17 (4A)		2184930.00	148700.00	1275.20	1274.00	51.00				
WP18	18A (4F,G)		2185280.00	148740.00	1276.90	1275.00	8.00				
WP18	18B (4H)		2185250.00	148960.00	1278.00	1275.00	15.75				
WP19	14										
WP19	15		?2180185.83	?150609.59	?1313.37	?1310.26	30.40				
WP19	16		?2180240.73	?150649.81	?1311.84	?1308.7	8.00				
WP19	80		2185705.00	146185.00	1298.50	1295.50	70.30				
WP19	81		2185330.00	146305.00	1307.90	1304.50	91.60				
WP19	82		2185935.00	146560.00	1314.00	1311.00	106.00				
WSW	WS-1	604			1219.86	1223.86					
WSW	WS-2	665			1210.46	1214.46					
WSW	WS-3	764			1223.00	1227.00					
WSW	WS-4	900			1213.00	1217.00					
WSW	WS-5	901			1213.00	1219.00					
WSW	WS-6	1004				1227.00					
WSW	WS-7	1007									
WSW	WS-8					1259.30					
WSW	WS-9	37				1242.00					
WSW	WS-11	3209									
WSW	WS-12	3211									
WSW	WS-13	3213	2186530.00	153110.00		1270.00					
WSW	WS-14	3601			1264.00						
WSW	WS-15	3501	2186640.00	155150.00		1253.00					
WSW	WS-16	3502	Abandoned		1269.00						
WSW	WS-17	3105	2185150.00	153090.00		1275.00					
WSW	WS-20	2127			1293.80						
WSW	WS-21	2119			1297.20						
WSW	WS-22	B2133			1283.10						
WSW	WS-23	2109			1297.54						
WSW	WS-24	3801									
WSW	WS-25	B3802									
WSW	WS-26	B3803									
WSW	WS-27	B4044									
WSW	WS-28		Abandoned								
?	28 old7C	T	2189502.70	148815.20	1274.50	1272.10		88.0	10.0	86.0	12.0

PRELIMINARY

WELL ID	Date Drilled (d-m-y)	LOCATION Northing (ft)	LOCATION Easting (ft)	Ground Elev (ft, msl)	N. Grade Elev. (ft, msl)	F. Grade Elev. (ft, msl)	FHB Elev. (ft, msl)	Initial Q (gpm)	Total Drawdown (ft)	Qs (gpm/ft)	Calc T from Qs†† (gpd/ft)	Perf Length (b) (ft)	Calc K K = T/b (gpd/ft^2)	Static W. L. (depth) (ft)	Static W. L. (date) (m-y)	Static W. L. Elev (ft, msl)	Q 1906 (FEB) (gpm)
WS-1	01-Aug-41	150710.53	2177109.95	1222.52	1223.06	n/a	n/a	336	405	0.0	1659	110	15	195	Jul 41	1039	245
WS-2	04-Dec-41	150165.55	2177192.73	1221.91	1214.46	n/a	n/a	330	270	1.2	2374	117	20	311	Dec 41	900	150
WS-3	11-Sep-42	157052.52	2177013.97	1221.52	1227.00	n/a	n/a	250	40	6.3	12500	130	96	250	Sep 42	977	n/o
WS-4	17-Aug-42	155713.02	2177209.67	1219.30	1217.00	n/a	n/a	250	115	2.2	4340	119	37	250	Aug 42	967	255
WS-5	10-Jun-42	154713.76	2177212.09	1222.00	1219.00	n/a	n/a	200	90	2.3	4622	171	27	260	Jun 42	959	210 †††
WS-6	13-Oct-42	153714	2177213	1228 †	1227.00	n/a	n/a	215	300	0.7	1433	71	20	250	Oct 42	977	140 †††
WS-7	15-Aug-43	152714	2177013	1230 †	1220.90	n/a	n/a	175	179	1.0	1955	154	13	151	Aug 43	1070	220
WS-8	05-Nov-43	159760	2102320	1260 †	1260	n/a	n/a	206	229	0.9	1799	150	11	195	Nov 43	1065	210 †††
WS-9	12-Nov-43	161260	2102320	1240 †	1240	n/a	n/a	171	194	0.9	1763	93	19	303	Nov 43	937	250
WS-10	25-Oct-43	163060	2102320	1245 †	1240.5	n/a	n/a	201	242	0.0	1661	95	17	163	Oct 43	1070	plugged
WS-11	14-Sep-42	151270.45	2106606.93	1205.99	1296.04	1296.04	1297.02	257	34	7.6	15110	105	02	390	May 44	900	230
WS-12	05-Sep-42	152105.30	2106469.95	1271.09	1277.37	1271.90	1273.61	220	29	7.9	15724	100	157	270	Nov 42	996	230
WS-13	01-May-42	153120.31	2106460.73	1260.01	1250.21	1260.60	1269.77	216	40	5.4	10000	130	70	212	May 42	1050	210
WS-14	23-Jul-42	154135.71	2106643.24	1260.13	1253.92	1263.92	1290.94	221	40	5.5	11050	100	59	369	May 43	934	235 †††
WS-15	30-May-42	155150.04	2106630.26	1260.73	1253.35	1260.92	1270.05	205	34	6.0	12059	116	104	250	May 42	1020	220
WS-16	19-Oct-42	156270.10	2106739.62	1266.32	1265.55	1267.26	1267.93	216	n/a	n/a	--	177	--	130	Jul 43	1130	240 ††† Plugg
WS-17	13-Aug-42	153094.67	2104965.10	1276.50	n/a	1275.50	1276.67	215	n/a	n/a	--	169	--	272	Aug 42	1005	n/o plugged
WS-18	12-Nov-42	154960	2105070	1275 †	1275.50	1275.50	1276.67	216	25	8.6	17200	140	117	290	Nov 42	907	n/o "
WS-19	04-Jul-42	156010	2105270	1275 †	1275.50	1275.50	1276.67	256	39	6.6	13120	225	58	273	Jul 42	1004	n/o "
WS-20	22-May-43	150751.25	2107449.09	1295.25	n/a	n/a	1293.80	115	163	0.7	1411	91	16	390	Jun 43	904	245
WS-21	19-Jun-43	149630.35	2107151.70	1299.60	n/a	n/a	1297.20	125	n/a	n/a	--	86	--	n/a	n/a	1297	195
WS-22	09-Jun-43	149625.62	2105926.54	1209.60	n/a	n/a	1203.10	165	n/a	n/a	--	120	--	n/a	n/a	1203	n/o
WS-23	06-Aug-43	140653.10	2106070.39	1299.26	n/a	n/a	1297.57	n/a	n/a	n/a	--	87	--	n/a	n/a	1290	n/o
WS-24	20-Sep-43	147300.79	2107512.00	1279.45	n/a	n/a	n/a	250	35	7.1	14206	n/a	--	215	Sep 43	n/a	230
WS-25	09-Nov-43	146105.13	2107515.34	1250.97	n/a	n/a	n/a	170	20	6.4	12714	n/a	--	145	Nov 43	n/a	215
WS-26	10-Nov-43	145195.39	2107493.37	1244.14	n/a	n/a	n/a	170	24	7.4	14033	n/a	--	120	Nov 43	n/a	225
WS-27	n/a	147329.42	2190949.23	1324.40	n/a	n/a	n/a	n/a	n/a	n/a	--	n/a	--	n/a	n/a	n/a	175
WS-28	n/a	140720.30	2102401.35	1250.66	n/a	n/a	n/a	n/a	n/a	n/a	--	n/a	--	n/a	n/a	n/a	plugged
WS-29	n/a	147610	2179770	1275 †	n/a	n/a	n/a	n/a	n/a	n/a	--	n/a	--	n/a	n/a	n/a	n/a
WS-30	n/a	154110	2171070	1220 NEW	n/c	n/c	n/c	n/c	n/c	n/c	--	n/c	--	n/c	n/c	n/c	150 p
WS-31	n/a	155760	2190370	1220 NEW	n/c	n/c	n/c	n/c	n/c	n/c	--	n/c	--	n/c	n/c	n/c	150 p
WS-32	n/a	152060	2191220	1250 NEW	n/c	n/c	n/c	n/c	n/c	n/c	--	n/c	--	n/c	n/c	n/c	150 p
WS-33	n/a	146010	2192570	1255 NEW	n/c	n/c	n/c	n/c	n/c	n/c	--	n/c	--	n/c	n/c	n/c	150 p
			Averages --)	1262 -	---	---	---	215	122	2	0215	133	53	--	--	1035	217
			N ---)	29				25	21	21	21	23	10	--	--	23	20

† - Denotes values of location and elevation estimated

†† - T calculated from specific capacity data using Q/s = T/2000 (after Driscoll, 1986, p. 1021).

††† - Calculated production rates from TAFB records before 1906 (max past pumping rate) used in model simulations

n/a - denotes not available

n/c - denotes well not constructed

n/o - denotes well not operated

p - denoted projected pumping rate used in model simulations

Note: Averages do not include any new (proposed) well data

APPENDIX C

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION VI
1445 ROSS AVENUE, SUITE 1200
DALLAS, TEXAS 75202

REC'D
4 AUG 1988
837-04

July 29, 1988

CERTIFIED MAIL: RETURN RECEIPT REQUESTED (P 921 631 609)

REPLY TO: 6W-PI

Colonel Richard Jarvis
USAF - Tinker AFB
2854 CES/DE
Tinker Air Force Base, Oklahoma 73145

Re: Application to Discharge to Waters of the United States
Permit No. OK0000809

Dear Colonel Jarvis:

Enclosed is the public notice of the Agency's final permit decision, a copy of our response to comments and the final permit. This public notice describes any substantial changes from the draft permit.

Should you have any questions, please feel free to contact the Permits Branch at the above address or telephone (214) 655-7190.

Sincerely yours,

Myron O. Knudson

Myron O. Knudson, P.E.
Director
Water Management Division (6W)

Enclosures

cc w/permit copy:
Oklahoma Water Resources
Board

D. Hickens

Advertising Order Number 8T-3361 -NNLX
U.S. Environmental Protection Agency - Region VI
Public Notice of Final Permit Decision

JULY 30, 1988

This is to give notice that the U.S. Environmental Protection Agency, Region VI, has made a final permit decision and will issue the following ONE (1) Proposed Permit(s) under the National Pollutant Discharge Elimination System. The permit(s) will become effective 30 days from the date of this Public Notice. Any substantial changes from the Draft Permit are cited.

This issuance is based on a final staff review of the administrative record and comments received. A Response to Comments is available by writing to:

Ms. Ellen Caldwell
Permits Branch (6W-PS)
U.S. Environmental Protection Agency - Region VI
1445 Ross Avenue
Dallas, Texas 75202-2733
(214) 655-7190

Any person may request an Evidentiary Hearing on this final permit decision. However, the request must be submitted within 30 days from the date of this Notice. The request should be in accordance with the requirements of 40 CFR 124.74 (Federal Register Vol. 45, No. 98, Monday, May 19, 1980). The original public notice contains the stay provisions of a granted evidentiary hearing request.

Further information including the administrative record may be viewed at the above address between 8 a.m. and 4:30 p.m., Monday through Friday.

NPDES authorization to discharge to waters of the United States, Permit No. OK0000809

The applicant's mailing address is: Oklahoma City ALC
Tinker Air Force Base, Oklahoma 73145

The discharge from this existing facility is made into a tributary of Soldier Creek and thence to Crutcho Creek, tributaries of the North Canadian River, a water of the United States classified for fish and wildlife propagation (secondary warm water fishery); agriculture; industrial and municipal process and cooling water; secondary body contact recreation; and aesthetics. The discharge is located on that water at Tinker Air Force Base in Oklahoma City, Oklahoma. Under the standard industrial classification (SIC) code 3411, the applicant's activities are aircraft maintenance and jet engine rebuilding.

There are substantial changes from the draft permit.

1. For Outfall 001, daily maximum concentration limitations are changed to 0.02 mg/l for cadmium, 0.1 mg/l for chromium, 0.05 mg/l for copper, 0.5 mg/l for nickel, 0.6 mg/l for zinc and 0.2 mg/l for phenols. All daily maximum mass limitations are changed based on a daily average flow of 0.9 MGD.

2. For Outfall 003, chromium limitations and monitoring are deleted.

3. For Outfall 006, chromium and zinc limitations and monitoring are deleted.

4. For Outfall 007, cadmium limitations and monitoring are deleted.

5. For Outfall 009, chromium and zinc limitations and monitoring are deleted; and BOD_5 limitations are changed to 30 mg/l from April 1 to October 31.

6. For Outfall 01S, mass limitations are changed to 72 lbs/day daily average for BOD_5 and 108 lbs/day daily average for TSS.

This is our response to the comments received on the subject draft NPDES permit in accordance with our regulations.

RESPONSE TO COMMENTS
DRAFT NPDES PERMIT

Permit No.:	OK0000809
Permittee:	United States Air Force
Facility Name/Location:	Oklahoma City ALC/Tinker AFB, Oklahoma
Draft Permit Public Notice Date:	March 12, 1988
Prepared by:	Fred Humke

Issue No. 1

Tinker AFB and OWRB request revisions to limitations for Outfall 001. As conditions of certification OWRB requires daily maximum limitations of 0.02 mg/l for cadmium, 0.1 mg/l for chromium, 0.05 mg/l for copper, 0.5 mg/l for nickel, and 0.6 mg/l for zinc. Also, both TAFB and OWRB recommend correction to 0.2 mg/l daily maximum for phenols based on section 1070.2 of the OWRB regulations.

Response No. 1

EPA has made these changes and recalculated and corrected mass limitations for all parameters based on the revised daily average flow of 0.9 MGD.

Issue No. 2

For Outfall 003, TAFB requests the deletion of chromium limits and monitoring based on the revised source data.

Response No. 2

EPA concurs.

Issue No. 3

For Outfall 006, TAFB requests the deletion of chromium and zinc limits and monitoring based on the revised source data.

Response No. 3

EPA concurs.

Issue No. 4

For Outfall 007, TAFB requests the deletion of cadmium limits and monitoring based on the revised source data; and the deletion of ammonia limits.

Response No. 4

EPA concurs.

Issue No. 5

For Outfall 009, TAFB requests the deletion of chromium and zinc limitations and monitoring based on the revised source data.

Response No. 5

EPA concurs.

Issue No. 6

For Outfall 009, OWRB requires as a condition of certification that BOD_5 limitations be revised to 30 mg/l from April 1 to October 31.

Response No. 6

EPA concurs.

Issue No. 7

For Outfall 015, TAFB requests revised mass limitation for BOD_5 and TSS based on revised application data for flow.

Response No. 7

EPA has recalculated mass limitation based on a daily average flow of 0.86 MGD.

Permit No. OK0000809

AUTHORIZATION TO DISCHARGE UNDER THE
NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM

In compliance with the provisions of the Clean Water Act, as amended, (33 U.S.C... 1251 et. seq; the "Act"),

Oklahoma City ALC
Tinker Air Force Base, Oklahoma 73145

is authorized to discharge from a facility located at Tinker Air Force Base, Oklahoma City, Oklahoma County, Oklahoma

to receiving waters named an unnamed tributary of Soldier Creek and thence to Crutcho Creek, tributaries of the North Canadian River

in accordance with effluent limitations, monitoring requirements and other conditions set forth in Parts I (23 pages), II (6 pages), and III (6 pages) hereof.

This permit shall become effective on August 30, 1988

This permit and the authorization to discharge shall expire at midnight, August 29, 1993

Signed and issued this 29th day of July 1988

Myron O. Knudson

Myron O. Knudson, P.E.
Director
Water Management Division (6W)

PART I
REQUIREMENTS FOR NPDES PERMITS

SECTION A. EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS

OUTFALL 001

During the period beginning the effective date and lasting through the expiration date, the permittee is authorized to discharge from Outfall 001 - treated industrial process waste.

Such discharges shall be limited and monitored by the permittee as specified below:

Effluent Characteristic	Discharge Limitations (*4) Mass (lbs/day)		Other Units (Specify)	
	Daily Avg	Daily Max	Daily Avg	Daily Max
Flow (MGD)	N/A	N/A	(*1)	(*1)
Chemical Oxygen Demand	563	1126	75 mg/l	150 mg/l
Total Suspended Solids	113	226	15 mg/l	30 mg/l
Cadmium, Total	(*1)	0.15	(*1) mg/l	0.02 mg/l
Chromium, Total	(*1)	0.75	(*1) mg/l	0.1 mg/l
Chromium, Hexavalent	(*1)	0.75	(*1) mg/l	0.1 mg/l
Cyanide, Total	(*1)	0.20	(*1) mg/l	0.025 mg/l
Copper, Total	(*1)	0.38	(*1) mg/l	0.05 mg/l
Lead, Total	(*1)	0.76	(*1) mg/l	0.1 mg/l
Nickel, Total	(*1)	3.75	(*1) mg/l	0.5 mg/l
Zinc, Total	(*1)	4.50	(*1) mg/l	0.6 mg/l
Phenols	(*1)	1.50	(*1) mg/l	0.2 mg/l
Oil and Grease	(*1)	113	(*1) mg/l	15 mg/l
Biomonitoring	N/A	N/A	N/A	N/A

Effluent Characteristic	Monitoring Requirements (*4) Measurement Frequency	Sample Type
Flow (MGD)	Continuous	Record
Chemical Oxygen Demand	3/week	24-Hr. Composite (*2)
Total Suspended Solids	3/week	24-Hr. Composite (*2)
Cadmium, Total	3/week	24-Hr. Composite (*2)
Chromium, Total	3/week	24-Hr. Composite (*2)
Chromium, Hexavalent	3/week	24-Hr. Composite (*2)
Cyanide, Total	3/week	24-Hr. Composite (*2)
Copper, Total	3/week	24-Hr. Composite (*2)
Lead, Total	3/week	24-Hr. Composite (*2)
Nickel, Total	3/week	24-Hr. Composite (*2)
Zinc, Total	3/week	24-Hr. Composite (*2)
Phenols	3/week	24-Hr. Composite (*2)
Oil and Grease	3/week	Grab
Biomonitoring	1/month	(*3)

OUTFALL 001

The pH shall not be less than 6.0 standard units nor greater than 9.0 standard units and shall be monitored 3/week by 24-hr. composite (*2).

There shall be no discharge of floating solids or visible foam in other than trace amounts.

Samples taken in compliance with the monitoring requirements specified above shall be taken at the following location(s): The treated industrial process waste will normally be reused on the base. It will occassionally be discharged to the unnamed tributary of Soldier Creek when the recycling upstream is not functioning. When discharging, the sample is to be taken at the Parshall flume just prior to discharge. Latitude: 35° 25' 35"; Longitude: 97° 22' 15".

FOOTNOTES

(*1) Report.
(*2) See Part II, Paragraph B.
(*3) See Part II, Paragraph C.
(*4) This permit may be reopened and limitations and monitoring for Outfall 001 modified to address Volatile Organic Compounds (VOC's) based on monitoring required under the Federal Facilities Compliance Agreement.

PART I
REQUIREMENTS FOR NPDES PERMITS

SECTION A. EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS

OUTFALL 002

During the period beginning the effective date and lasting through the expiration date, the permittee is authorized to discharge from Outfall 002 - stormwater and previously monitored cooling tower blowdown.

Such discharges shall be limited and monitored by the permittee as specified below:

Effluent Characteristic	Discharge Limitations			
	Mass(lbs/day)		Other Units (Specify)	
	Daily Avg	Daily Max	Daily Avg	Daily Max
Flow (MGD)	N/A	N/A	(*1)	(*1)
Total Organic Carbon	N/A	N/A	(*1) mg/l	70 mg/l
Total Suspended Solids	N/A	N/A	(*1) mg/l	50 mg/l
Oil and Grease	N/A	N/A	(*1) mg/l	15 mg/l
Temperature	N/A	N/A	85°F	90°F

Effluent Characteristic	Monitoring Requirements	
	Measurement Frequency	Sample Type
Flow (MGD)	1/week	Estimate
Total Organic Carbon	1/week	Grab
Total Suspended Solids	1/week	Grab
Oil and Grease	1/week	Grab
Temperature	1/week	Grab

OUTFALL 002

The pH shall not be less than 6.0 standard units nor greater than 9.0 standard units and shall be monitored 1/week by grab sample.

There shall be no discharge of floating solids or visible foam in other than trace amounts.

Samples taken in compliance with the monitoring requirements specified above shall be taken at the following location(s): At the V-notch weir which overflows from the sedimentation basin located on the east side of East Soldier Creek. Latitude: 35° 25' 32"; Longitude: 97° 22' 18".

FOOTNOTES

(*1) Report.

PART I
REQUIREMENTS FOR NPDES PERMITS

SECTION A. EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS

OUTFALL 003

During the period beginning the effective date and lasting through the expiration date, the permittee is authorized to discharge from Outfall 003 - cooling tower blowdown from building 3306.

Such discharges shall be limited and monitored by the permittee as specified below:

Effluent Characteristic	Discharge Limitations			
	Mass(lbs/day)		Other Units (Specify)	
	Daily Avg	Daily Max	Daily Avg	Daily Max
Flow (MGD)	N/A	N/A	(*1)	(*1)
Phosphates, Total (as P)	N/A	N/A	5.0 mg/l	5.0 mg/l

Effluent Characteristic	Monitoring Requirements	
	Measurement Frequency	Sample Type
Flow (MGD)	1/week	Estimate
Phosphates, Total (as P)	1/week	Grab

OUTFALL 003

The pH shall not be less than N/A standard units nor greater than N/A standard units and shall be monitored N/A.

There shall be no discharge of floating solids or visible foam in other than trace amounts.

Samples taken in compliance with the monitoring requirements specified above shall be taken at the following location(s): At the cooling tower blowdown outfall before the discharge is combined with Outfall 002. Latitude: 35° 25' 18"; Longitude: 97° 22' 35".

FOOTNOTES

(*1) Report.

PART I
REQUIREMENTS FOR NPDES PERMITS

SECTION A. EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS

OUTFALL 004

During the period beginning the effective date and lasting through the expiration date, the permittee is authorized to discharge from Outfall 004 - cooling tower blowdown from building 3108.

Such discharges shall be limited and monitored by the permittee as specified below:

Effluent Characteristic	Discharge Limitations			
	Mass(lbs/day)		Other Units (Specify)	
	Daily Avg	Daily Max	Daily Avg	Daily Max
Flow (MGD)	N/A	N/A	(*1)	(*1)
Phosphates, Total (as P)	N/A	N/A	5.0 mg/l	5.0 mg/l
Temperature	N/A	N/A	85°F	98°F

Effluent Characteristic	Monitoring Requirements	
	Measurement Frequency	Sample Type
Flow (MGD)	1/week	Estimate
Phosphates, Total (as P)	1/week	Grab
Temperature	1/week	Grab

OUTFALL 004

The pH shall not be less than 6.0 standard units nor greater than 9.0 standard units and shall be monitored 1/week by grab sample.

There shall be no discharge of floating solids or visible foam in other than trace amounts.

Samples taken in compliance with the monitoring requirements specified above shall be taken at the following location(s): At the cooling tower blowdown outfall before the discharge reaches the storm sewer. Latitude: 35° 25' 17"; Longitude: 97° 22' 45".

FOOTNOTES

(*1) Report.

PART I
REQUIREMENTS FOR NPDES PERMITS

SECTION A. EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS

OUTFALL 005

During the period beginning the effective date and lasting through the expiration date, the permittee is authorized to discharge from Outfall 005 - storm water overflow.

Such discharges shall be limited and monitored by the permittee as specified below:

Effluent Characteristic	Discharge Limitations			
	Mass(lbs/day)		Other Units (Specify)	
	Daily Avg	Daily Max	Daily Avg	Daily Max
Flow (MGD)	N/A	N/A	(*1)	(*1)
Oil and Grease	N/A	N/A	(*1) mg/l	50 mg/l

Effluent Characteristic	Monitoring Requirements	
	Measurement Frequency	Sample Type
Flow (MGD)	1/week	Estimate
Oil and Grease	1/week	Grab

OUTFALL 005

The pH shall not be less than N/A standard units nor greater than N/A standard units and shall be monitored N/A.

There shall be no discharge of floating solids or visible foam in other than trace amounts.

Samples taken in compliance with the monitoring requirements specified above shall be taken at the following location(s): At the overflow from the low water dam.

FOOTNOTES

(*1) Report.

PART I
REQUIREMENTS FOR NPDES PERMITS

SECTION A. EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS

OUTFALL 006

During the period beginning the effective date and lasting through the expiration date, the permittee is authorized to discharge from Outfall 006 - non-contact cooling water and storm sewer serving the north end of B/3001.

Such discharges shall be limited and monitored by the permittee as specified below:

Effluent Characteristic	Discharge Limitations			
	Mass (lbs/day)		Other Units (Specify)	
	Daily Avg	Daily Max	Daily Avg	Daily Max
Flow (MGD)	N/A	N/A	(*1)	(*1)
Oil and Grease	N/A	N/A	(*1) mg/l	15 mg/l
Ammonia (as N)	N/A	N/A	(*1) mg/l	(*1) mg/l

Effluent Characteristic	Monitoring Requirements	
	Measurement Frequency	Sample Type
Flow (MGD)	1/week	Estimate
Oil & Grease	1/week (*2)	Grab
Ammonia (as N)	1/week (*2)	Grab

OUTFALL 006

The pH shall not be less than 6.0 standard units nor greater than 9.0 standard units and shall be monitored 1/week (*2) by grab sample.

There shall be no discharge of floating solids or visible foam in other than trace amounts.

Samples taken in compliance with the monitoring requirements specified above shall be taken at the following location(s): At the V-notch weir which overflows to Soldiers Creek. Latitude: 35° 25' 32"; Longitude: 97° 22' 25".

FOOTNOTES

(*1) Report.
(*2) When discharge occurs.

PART I
REQUIREMENTS FOR NPDES PERMITS

SECTION A. EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS

OUTFALL 007

During the period beginning the effective date and lasting through the expiration date, the permittee is authorized to discharge from Outfall 007 - storm sewer serving area "A", including discharges from occasional rinse water from an aircraft washrack.

Such discharges shall be limited and monitored by the permittee as specified below:

Effluent Characteristic	Discharge Limitations			
	Mass(lbs/day)		Other Units (Specify)	
	Daily Avg	Daily Max	Daily Avg	Daily Max
Flow (MGD)	N/A	N/A	(*1)	(*1)
Ammonia (as N)	N/A	N/A	(*1) mg/l	(*1) mg/l
Oil & Grease	N/A	N/A	(*1) mg/l	15 mg/l

Effluent Characteristic	Monitoring Requirements	
	Measurement Frequency	Sample Type
Flow (MGD)	1/week	Estimate
Ammonia (as N)	1/week (*2)	Grab
Oil & Grease	1/week (*2)	Grab

OUTFALL 007

The pH shall not be less than 6.0 standard units nor greater than 9.0 standard units and shall be monitored 1/week (*2) by grab sample.

There shall be no discharge of floating solids or visible foam in other than trace amounts.

Samples taken in compliance with the monitoring requirements specified above shall be taken at the following location(s): At the sluice gate on Kuhlman Creek. Latitude: 35° 25' 33.3"; Longitude: 97° 24' 15.9".

FOOTNOTES

(*1) Report.
(*2) During periods of discharge.

PART I
REQUIREMENTS FOR NPDES PERMITS

SECTION A. EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS

OUTFALL 008

During the period beginning the effective date and lasting through the expiration date, the permittee is authorized to discharge from Outfall 008 - stormwater, plasma spray booth, and previously monitored cooling tower blowdown.

Such discharges shall be limited and monitored by the permittee as specified below:

Effluent Characteristic	Discharge Limitations			
	Mass (lbs/day)		Other Units (Specify)	
	Daily Avg	Daily Max	Daily Avg	Daily Max
Flow (MGD)	N/A	N/A	(*1)	(*1)
Oil & Grease	N/A	N/A	(*1) mg/l	15 mg/l

Effluent Characteristic	Monitoring Requirements	
	Measurement Frequency	Sample Type
Flow (MGD)	1/week	Estimate
Oil & Grease	1/week (*2)	Grab

OUTFALL 008

The pH shall not be less than 6.0 standard units nor greater than 9.0 standard units and shall be monitored 1/week (*2) by grab sample.

There shall be no discharge of floating solids or visible foam in other than trace amounts.

Samples taken in compliance with the monitoring requirements specified above shall be taken at the following location(s): At the V-notch ~~main~~ weir located on unnamed tributary of Soldier Creek. Latitude: 35° 25' 37.3"; Longitude: 97° 22' 45".

FOOTNOTES

(*1) Report.
(*2) During periods of discharge.

PART I
REQUIREMENTS FOR NPDES PERMITS

SECTION A. EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS

OUTFALL 009

During the period beginning the effective date and lasting through the expiration date, the permittee is authorized to discharge from Outfall 009 -- two oil separators near B1030 and oil/water separator at the AWACW alert facility; runoff from a washrack, a chemical storage area and the base fire training pit; and discharge from storm sewers serving the AWACW alert facility and part of area "C" B2280 in are "C"; and in the event of a fire discharges aquaeous film forming foam (AFFF fire extinguishing foam).

Such discharges shall be limited and monitored by the permittee as specified below:

Effluent Characteristic	Discharge Limitations			
	Mass(lbs/day)		Other Units (Specify)	
	Daily Avg	Daily Max	Daily Avg	Daily Max
Flow (MGD)	N/A	N/A	(*1)	(*1)
Biochemical Oxygen Demand (5-day)	N/A	N/A	(*1) mg/l	(*3) mg/l
Chemical Oxygen Demand	N/A	N/A	(*1) mg/l	100 mg/l
Ammonia (as N)	N/A	N/A	(*1) mg/l	(*1) mg/l
Oil & Grease	N/A	N/A	(*1) mg/l	15 mg/l

Effluent Characteristic	Monitoring Requirements	
	Measurement Frequency	Sample Type
Flow (MGD)	1/week	Estimate
Biochemical Oxygen Demand (5-day)	1/week (*2)	Grab
Chemical Oxygen Demand	1/week (*2)	Grab
Ammonia (as N)	1/week (*2)	Grab
Oil & Grease	1/week (*2)	Grab

OUTFALL 009

The pH shall not be less than 6.0 standard units nor greater than 9.0 standard units and shall be monitored 1/week (*2) by grab sample.

There shall be no discharge of floating solids or visible foam in other than trace amounts.

Samples taken in compliance with the monitoring requirements specified above shall be taken at the following location(s): At the sluice gate on an unnamed tributary of Crutcho Creek. Latitude: 35° 24' 47.6"; Longitude: 97° 23' 56.6".

FOOTNOTES

(*1) Report.
(*2) During periods of discharge.
(*3) 50 mg/l (November 1 to March 31)
30 mg/l (April 1 to October 31)

PART I
REQUIREMENTS FOR NPDES PERMITS

SECTION A. EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS

OUTFALL 01S

During the period beginning the effective date and lasting through the expiration date, the permittee is authorized to discharge from Outfall 01S - sanitary sewage discharge.

Such discharges shall be limited and monitored by the permittee as specified below:

Effluent Characteristic	Discharge Limitations			
	Mass (lbs/day)		Other Units (Specify)	
	Daily Avg	Daily Max	Daily Avg	Daily Max
Flow (MGD)	N/A	N/A	(*1)	(*1)
Biochemical Oxygen Demand (5-day)	72	(*1)	10 mg/l	15 mg/l
Total Suspended Solids	108	(*1)	15 mg/l	25 mg/l

Effluent Characteristic	Monitoring Requirements	
	Measurement Frequency	Sample Type
Flow (MGD)	Continuous	Record
Biochemical Oxygen Demand (5-day)	1/week	24-Hr. Composite (*2)
Total Suspended Solids	1/week	24-Hr. Composite (*2)

OUTFALL 01S

The pH shall not be less than 6.0 standard units nor greater than 9.0 standard units and shall be monitored 1/week by 24-hr. composite (*2).

There shall be no discharge of floating solids or visible foam in other than trace amounts.

Samples taken in compliance with the monitoring requirements specified above shall be taken at the following location(s): After the pressure filter at the manhole located approximately 10 feet north of the pressure filter building before discharging to Soldier Creek. Latitude: 35° 25' 35"; Longitude: 97° 22' 19".

FOOTNOTES

(*1) Report.
(*2) See Part II, Paragraph B.

SECTION B. SCHEDULE OF COMPLIANCE

The permittee shall achieve compliance with the effluent limitations specified for discharges in accordance with the following schedule:

NONE

Reports of compliance or noncompliance with, or any progress reports on, interim and final requirements contained in any compliance schedule of this permit shall be submitted no later than 14 days following each schedule date. Any reports of noncompliance shall include the cause of noncompliance, any remedial actions taken, and the probability of meeting the next scheduled requirement.

SECTION C. REPORTING OF MONITORING RESULTS

Monitoring results shall be reported in accordance with the provisions of Part III.D.4 of the permit. Monitoring results obtained during the previous month shall be summarized and reported on a Discharge Monitoring Report form postmarked no later than the 15th day of the month following the completed reporting period. The first report is due on August 15, 1988.

PART II
OTHER CONDITIONS

A. "Cyanide, A" is defined to be those cyanides amenable to chlorination as described in the 1972 Annual Book of ASTM Standards, Standard D 2036-72, Method B, page 533.

B. The term "composite sample" means a sample consisting of a minimum of four grab samples of effluent collected at regular intervals over a normal operating day and combined in proportion to flow, or a sample continuously collected in proportion to flow, over a normal operating day.

C. <u>CHRONIC BIOMONITORING REQUIREMENTS</u>

a. The permittee shall test the effluent for toxicity in accordance with the provisions in this section. Such testing will determine if an appropriately dilute effluent sample affects the survival and reproduction or growth of the appropriate test organism. The permittee shall initiate the following series of tests within 60 days of the effective date of this permit to evaluate wastewater toxicity. All test organisms, procedures, and water quality assurance criterion used shall be in accordance with the latest revision of "Short-Term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Freshwater Organisms", EPA 600/4-85/014. The following tests shall be used:

1) The permittee shall conduct a 7-day <u>Ceriodaphnia dubia</u> survival and reproduction test (Method 1002.0).

2) The permittee shall conduct a 7-day fathead minnow (<u>Pimephales promelas</u>) larval survival and growth test (Method 1000.0).

b. A minimum of 5 dilutions must be performed in addition to an appropriate control, using a minimum dilution factor of 0.3, i.e., 100%, 30%, 10%, 3%, and 1%. In addition, two dilutions consisting of 85% and 73% of the final effluent must be contained in the test series.

c. The samples shall be collected at a point following the last treatment unit. Dilution water used in toxicity tests will be receiving stream water collected at a point upstream of the discharge. If receiving water is unsatisfactory as a result of pre-existing in-stream toxicity (greater than 20% mortality in the control), the permittee must substitute reconstituted dilution water, with hardness and alkalinity similar to that of the receiving stream water. The permittee shall also report to EPA the toxicity of the upstream receiving water.

d. Flow-weighted 24-hour composite samples representative of dry weather flows during normal operation will be collected from Outfalls 001 and 013. These composites shall be combined in proportion to the average flow from each outfall for the day the sample was collected. The toxicity tests shall be performed on the flow-weighted composite of outfall samples.

e. The toxicity tests specified in paragraphs (a) and (b) above shall be conducted once per month. The permittee shall prepare a full report of the results according to EPA 600/4-85/014, Section 10, Report Preparation. This full report need not be submitted unless requested and shall be retained following the provisions of Part III.C.3 of this permit.

f. The permittee shall submit the toxicity testing information contained in Table 1 of this permit to EPA along with the Discharge Monitoring Report (DMR) submitted for the end of the reporting period following the toxicity test.

g. Should no toxicity occur within the first year of toxicity testing, in accordance with paragraph (h) below, for both species tested at the effluent dilution equivalent to 1/2 of low flow (85%), the permittee shall certify this information in writing to EPA Region VI and these biomonitoring requirements shall expire.

h. For the purpose of this biomonitoring requirement, chronic toxicity is defined as a statistically significant difference at the 95% confidence level between the survival and growth or reproduction in the appropriate test organism exposed to the control and to an effluent dilution.

i. This permit shall be reopened to require further monitoring studies and/or effluent limits if biomonitoring data show actual or potential ambient toxicity to be the result of the permittee's discharge to the receiving stream. Modification or revocation of the permit is subject to the provisions of 40 CFR Part 122.62. Accelerated or intensified toxicity testing may be required in accordance with Section 308 of the Clean Water Act.

TABLE 1

BIOMONITORING REPORTING

CERIODAPHNIA DUBIA SURVIVAL AND REPRODUCTION TEST

Permittee: ______________________________
NPDES No. ________________

Composite collected FROM: __________ am/pm __________ date
TO: __________ am/pm __________ date

Test initiated: __________ am/pm ______________ date

Dilution water used: [ ] Receiving water [ ] Reconstituted water

NUMBER OF YOUNG PRODUCED PER FEMALE @ 7 DAYS

Percent effluent (%)

REP	0%	1%	3%	10%	30%	100%	% at low flow -----%	% at 1/2 low flow -----%
A								
B								
C								
D								
E								
F								
G								
H								
I								
J								

TABLE 1 (Continued)

BIOMONITORING REPORTING

CERIODAPHNIA DUBIA SURVIVAL AND REPRODUCTION TEST

Permittee: ______________________________
NPDES No.: ____________________

PERCENT SURVIVAL

Percent effluent (%)

Time of Reading	0%	1%	3%	10%	30%	100%	% at low flow -----%	% at 1/2 low flow -----%
24h								
48h								
7-day								

1. Fisher's Exact Test:

   Is the mean survival at 7 days significantly different (p=0.05) than the control survival for the % effluent corresponding to:

   a. LOW FLOW: _______ YES _______ NO
   b. 1/2 LOW FLOW: _______ YES _______ NO

2. Dunnett's Procedure or Steel's Many-One Rank Test as appropriate:

   Is the mean number of young produced per female significantly different (p=0.05) than the control's number of young per female for the % effluent corresponding to:

   a. LOW FLOW: _______ YES _______ NO
   b. 1/2 LOW FLOW: _______ YES _______ NO

3. Enter percent effluent corresponding to each NOEL below and circle lowest number:

   a. NOEL survival = _________ % effluent
   b. NOEL reproduction = _________ % effluent

4. If you answered NO to 1.a. and 2.a., enter [N]; otherwise enter [Y]: _____

5. Enter response to item 4 on DMR Form, parameter No. TCP3B.

6. If you answered NO to 1.b. and 2.b., enter [N]; otherwise enter [Y]: _____

7. Enter response to item 6 on DMR Form, parameter No. TDP3B.

TABLE 1 (Continued)

BIOMONITORING REPORTING

FATHEAD MINNOW LARVAE GROWTH AND SURVIVAL TEST
(Pimephales promelas)

Permittee: ______________________________
NPDES No.: ______________

Composite collected FROM: __________ am/pm ____________ date
TO: __________ am/pm ____________ date

Test initiated: __________ am/pm ________________ date

Dilution water used: [ ] Receiving water [ ] Reconstituted water

DATA TABLE FOR GROWTH OF FATHEAD MINNOWS

Effluent Conc. (%)	Average Dry Weight in milligrams in replicate chambers A	B	C	D	MEAN DRY WEIGHT mg	CV%*
0%						
1%						
3%						
10%						
30%						
100%						
Low Flow %						
1/2 Low Flow %						

* coefficient of variation = standard deviation x 100/mean

1. Dunnett's Procedure:

Is the mean dry weight (growth) at 7 days effluent significantly different (p=0.05) than the control's dry weight (growth) for the % effluent corresponding to:

a. LOW FLOW: ______ YES ______ NO
b. 1/2 LOW FLOW: ______ YES ______ NO

TABLE 1 (Continued)

BIOMONITORING REPORTING

FATHEAD MINNOW LARVAE GROWTH AND SURVIVAL TEST
(Pimephales promelas)

Permittee: ______________________________
NPDES No.: ________________

DATA TABLE FOR FATHEAD MINNOW SURVIVAL

Effluent Conc. (%)	Percent Survival in replicate chambers				MEAN PERCENT SURVIVAL			
	A	B	C	D	24h	48h	7-day	CV%*
0%								
1%								
3%								
10%								
30%								
100%								
Low Flow %								
1/2 Low Flow %								

* coefficient of variation = standard deviation x 100/mean

2. Dunnett's Procedure or Steel's Many-One Rank Test as appropriate:

   Is the mean survival at 7 days significantly different (p=0.05) than the control survival for the % effluent corresponding to:

   a. LOW FLOW: _____ YES _____ NO
   b. 1/2 LOW FLOW: _____ YES _____ NO

3. Enter percent effluent corresponding to each NOEL below and circle lowest number:

   a. NOEL survival = ________ % effluent
   b. NOEL growth = ________ % effluent

4. If you answered NO to 1.a. and 2.a., enter [N]; otherwise enter [Y]: ____

5. Enter response to item 4 on DMR Form, parameter No. TCP6C.

6. If you answered NO to 1.b. and 2.b., enter [N]; otherwise enter [Y]: ____

7. Enter response to item 6 on DMR Form, parameter No. TDP6C.

PART III

STANDARD CONDITIONS FOR NPDES PERMITS

SECTION A. GENERAL CONDITIONS

Introduction

In accordance with the provisions of 40 CFR Part 122.41, et. seq., this permit incorporates by reference ALL conditions and requirements applicable to NPDES Permits set forth in the Clean Water Act, as amended, (hereinafter known as the "Act") as well as ALL applicable CFR regulations.

1. **Duty to Comply**
The permittee must comply with all conditions of this permit. Any permit noncompliance constitutes a violation of the Act and is grounds for enforcement action; for permit termination, revocation and reissuance, or modification; or for denial of a permit renewal application.

2. **Toxic Pollutants**
   a. Notwithstanding Part III.A.5, if any toxic effluent standard or prohibition (including any schedule of compliance specified in such effluent standard or prohibition) is promulgated under Section 307(a) of the Act for a toxic pollutant which is present in the discharge and that standard or prohibition is more stringent than any limitation on the pollutant in this permit, this permit shall be modified or revoked and reissued to conform to the toxic effluent standard or prohibition.
   b. The permittee shall comply with effluent standards or prohibitions established under Section 307(a) of the Act for toxic pollutants within the time provided in the regulations that established those standards or prohibitions, even if the permit has not yet been modified to incorporate the requirement.

4. **Duty to Reapply**
If the permittee wishes to continue an activity regulated by this permit after the expiration date of this permit, the permittee must apply for and obtain a new permit. The application shall be submitted at least 180 days before the expiration date of this permit. The Director may grant permission to submit an application less than 180 days in advance but no later than the permit expiration date. Continuation of expiring permits shall be governed by regulations promulgated at 40 CFR Part 122.6 and any subsequent amendments.

5. **Permit Flexibility**
This permit may be modified, revoked and reissued, or terminated for cause in accordance with 40 CFR 122.62-64. The filing of a request for a permit modification, revocation and reissuance, or termination, or a notification of planned changes or anticipated noncompliance, does not stay any permit condition.

6. **Property Rights**
This permit does not convey any property rights of any sort, or any exclusive privilege.

7. **Duty to Provide Information**
The permittee shall furnish to the Director, within a reasonable time, any information which the Director may request to determine whether cause exists for modifying, revoking and reissuing, or terminating this permit, or to determine compliance with this permit. The permittee shall also furnish to the Director, upon request, copies of records required to be kept by this permit.

8. **Criminal and Civil Liability**
Except as provided in permit conditions on "Bypassing" and "Upsets", nothing in this permit shall be construed to relieve the permittee from civil or criminal penalties for noncompliance. Any false or materially misleading representation or concealment of information required to be reported by the provisions of the permit, the Act or applicable CFR regulations which avoids or effectively defeats the regulatory purpose of the Permit may subject the Permittee to criminal enforcement pursuant to 18 U.S.C. Section 1001.

9. **Oil and Hazardous Substance Liability**
Nothing in this permit shall be construed to preclude the institution of any legal action or relieve the permittee from any responsibilities, liabilities, or penalties to which the permittee is or may be subject under Section 311 of the Act.

10. **State Laws**
Nothing in this permit shall be construed to preclude the institution of any legal action or relieve the permittee from any responsibilities, liabilities, or penalties established pursuant to any applicable State law or regulation under authority preserved by Section 510 of the Act.

11. **Severability**
The provisions of this permit are severable, and if any provision of this permit or the application of any provision of this permit to any circumstance is held invalid, the application of such provision to other circumstances, and the remainder of this permit, shall not be affected thereby.

SECTION B. PROPER OPERATION AND MAINTENANCE

1. **Need to Halt or Reduce not a Defense**
It shall not be a defense for a permittee in an enforcement action that it would have been necessary to halt or reduce the permitted activity in order to maintain compliance with the conditions of this permit.

2. **Duty to Mitigate**
The permittee shall take all reasonable steps to minimize or prevent any discharge in violation of this permit which has a reasonable likelihood of adversely affecting human health or the environment.

3. **Proper Operation and Maintenance**
The permittee shall at all times properly operate and maintain

all facilities and systems of treatment and control (and related appurtenances) which are installed or used by the permittee to achieve compliance with the conditions of this permit. Proper operation and maintenance also includes adequate laboratory controls and appropriate quality assurance procedures. This provision requires the operation of backup or auxiliary facilities or similar systems which are installed by a permittee only when the operation is necessary to achieve compliance with the conditions of the permit.

4. **Bypass of Treatment Facilities**
   a. **Bypass not exceeding limitations.** The permittee may allow any bypass to occur which does not cause effluent limitations to be exceeded, but only if it also is for essential maintenance to assure efficient operation. These bypasses are not subject to the provisions of Parts III.B.4.b and 4.c.
   b. **Notice**
      (1) **Anticipated bypass.** If the permittee knows in advance of the need for a bypass, it shall submit prior notice, if possible at least ten days before the date of the bypass.
      (2) **Unanticipated bypass.** The permittee shall, within 24 hours, submit notice of an unanticipated bypass as required in Part III.D.7.
   c. **Prohibition of bypass**
      (1) Bypass is prohibited, and the Director may take enforcement action against a permittee for bypass, unless:
         (a) Bypass was unavoidable to prevent loss of life, personal injury, or severe property damage;
         (b) There were no feasible alternatives to the bypass, such as the use of auxiliary treatment facilities, retention of untreated wastes, or maintenance during normal periods of equipment downtime. This condition is not satisfied if adequate back-up equipment should have been installed in the exercise of reasonable engineering judgment to prevent a bypass which occurred during normal periods of equipment downtime or preventive maintenance; and,
         (c) The permittee submitted notices as required by Part III.B.4.b.
      (2) The Director may approve an anticipated bypass, after considering its adverse effects, if the Director determines that it will meet the three conditions listed at Part III.B.4.c(1).

5. **Upset Conditions**
   a. **Effect of an upset.** An upset constitutes an affirmative defense to an action brought for noncompliance with such technology-based permit effluent limitations if the requirements of Part III.B.5.b are met. No determination made during administrative review of claims that noncompliance was caused by upset, and before an action for noncompliance, is final administrative action subject to judicial review.
   b. **Conditions necessary for a demonstration of upset.** A permittee who wishes to establish the affirmative defense of upset shall demonstrate, through properly signed, contemporaneous operating logs, or other relevant evidence that:
      (1) An upset occurred and that the permittee can identify the cause(s) of the upset;
      (2) The permitted facility was at the time being properly operated;
      (3) The permittee submitted notice of the upset as required by Part III.D.7; and,
      (4) The permittee complied with any remedial measures required by Part III.B.2.
   c. **Burden of proof.** In any enforcement proceeding the permittee seeking to establish the occurrence of an upset has the burden of proof.

6. **Removed Substances**
   Solids, sludges, filter backwash, or other pollutants removed in the course of treatment or control of wastewaters shall be disposed of in a manner such as to prevent any pollutant from such materials from entering navigable waters.

SECTION C. MONITORING AND RECORDS

1. **Inspection and Entry**
   The permittee shall allow the Director, or an authorized representative, upon the presentation of credentials and other documents as may be required by the law to:
   a. Enter upon the permittee's premises where a regulated facility or activity is located or conducted, or where records must be kept under the conditions of this permit;
   b. Have access to and copy, at reasonable times, any records that must be kept under the conditions of this permit;
   c. Inspect at reasonable times any facilities, equipment (including monitoring and control equipment), practices or operations regulated or required under this permit; and
   d. Sample or monitor at reasonable times, for the purposes of assuring permit compliance or as otherwise authorized by the Act, any substances or parameters at any location.

2. **Representative Sampling**
   Samples and measurements taken for the purpose of monitoring shall be representative of the monitored activity.

3. **Retention of Records**
   The permittee shall retain records of all monitoring information, including all calibration and maintenance records and all original strip chart recordings for continuous monitoring instrumentation, copies of all reports required by this permit, and records of all data used to complete the application for this permit, for a period of at least 3 years from the date of the sample, measurement, report, or application. This period may be extended by request of the Director at any time.

4. **Record Contents**
   Records of monitoring information shall include:

a. The date, exact place, and time of sampling or measurements;
b. The individual(s) who performed the sampling or measurements;
c. The date(s) analyses were performed;
d. The individual(s) who performed the analyses;
e. The analytical techniques or methods used; and
f. The results of such analyses.

Monitoring Procedures

Monitoring must be conducted according to test procedures approved under 40 CFR Part 136, unless other test procedures have been specified in this permit.

Flow Measurements

Appropriate flow measurement devices and methods consistent with accepted scientific practices shall be selected and used to insure the accuracy and reliability of measurements of the volume of monitored discharges. The devices shall be installed, calibrated, and maintained to insure that the accuracy of the measurements are consistent with the accepted capability of that type of device. Devices selected shall be capable of measuring flows with a maximum deviation of less than ± 10% from true discharge rates throughout the range of expected discharge volumes. Guidance in selection, installation, calibration, and operation of acceptable flow measurement devices can be obtained from the following references:

a. "A Guide to Methods and Standards for the Measurement of Water Flow", U.S. Department of Commerce, National Bureau of Standards, NBS Special Publication 421, May 1975, 97 pp. (Available from the U.S. Government Printing Office, Washington, D.C. 20402. Order by SD Catalog No. C13.10:421).
b. "Water Measurement Manual", U.S. Department of Interior, Bureau of Reclamation, Second Edition, Revised Reprint, 1974, 327 pp. (Available from the U.S. Government Printing Office, Washington, D.C. 20402. Order by Catalog No. I27.19/2:W29/2, Stock No. S/N24003-0027).
c. "Flow Measurement in Open Channels and Closed Conduits", U.S. Department of Commerce, National Bureau of Standards, NBS Special Publication 484, October 1977, 982 pp. (Available in paper copy or microfiche from National Technical Information Service (NTIS), Springfield, VA 22151. Order by NTIS No. PB-273535/5ST).
d. "NPDES Compliance Sampling Manual", U.S. Environmental Protection Agency, Office of Water Enforcement, Publication MCD-51, 1977, 140 pp. (Available from the General Services Administration (8FPS), Centralized Mailing Lists Services, Building 41, Denver Federal Center, Denver, CO 80225).

SECTION D. REPORTING REQUIREMENTS

1. **Planned Changes**

a. **Industrial Permits**

The permittee shall give notice to the Director as soon as possible of any planned physical alterations or additions to the permitted facility. Notice is required only when:

(1) The alteration or addition to a permitted facility may meet one of the criteria for determining whether a facility is a new source in 40 CFR Part 122.29(b); or,

(2) The alteration or addition could significantly change the nature or increase the quantity of pollutants discharged. This notification applies to pollutants which are subject neither to effluent limitations in the permit, nor to notification requirements under 40 CFR Part 122.42(a) (1).

b. **Municipal Permits**

Any change in the facility discharge (including the introduction of any new source or significant discharge or significant changes in the quantity or quality of existing discharges of pollutants) must be reported to the permitting authority. In no case are any new connections, increased flows, or significant changes in influent quality permitted that will cause violation of the effluent limitations specified herein.

2. **Anticipated Noncompliance**

The permittee shall give advance notice to the Director of any planned changes in the permitted facility or activity which may result in noncompliance with permit requirements.

3. **Transfers**

This permit is not transferable to any person except after notice to the Director. The Director may require modification or revocation and reissuance of the permit to change the name of the permittee and incorporate such other requirements as may be necessary under the Act.

4. **Discharge Monitoring Reports**

Monitoring results must be reported on Discharge Monitoring Report (DMR) Form EPA No. 3320-1 in accordance with the "General Instructions" provided on the form. The permittee shall submit the original DMR to the EPA with copies of the DMR to the State Agency. Duplicate copies of the DMRs, signed and certified as required by Part III.D. 11 and all other reports required by Part III.D shall be submitted to the Director and to the State (if applicable) at the following address(es):

Water Management Division
Enforcement Branch (6W-E)
U.S. Environmental Protection Agency, Region VI
Allied Bank Tower
1445 Ross Avenue
Dallas, Texas 75202-2733

Oklahoma (Industrial Permits)
Director
Oklahoma Water Resources Boa
P.O. Box 53585
Oklahoma City, Oklahoma 731

New Mexico:
Program Manager
Surface Water Section
Surface Water Quality Bureau
New Mexico Environmental Improvement Division
P.O. Box 968
Santa Fe, New Mexico 87504-0968

Louisiana:
Assistant Secretary for Water
Water Pollution Control Division
Louisiana Department of Environmental Quality
P.O. Box 44091
Baton Rouge, Louisiana 70804-4091

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5. **Additional Monitoring by the Permittee**
If the permittee monitors any pollutant more frequently than required by this permit, using test procedures approved under 40 CFR Part 136 or as specified in this permit, the results of this monitoring shall be included in the calculation and reporting of the data submitted in the Discharge Monitoring Report (DMR). Such increased monitoring frequency shall also be indicated on the DMR.

6. **Averaging of Measurements**
Calculations for all limitations which require averaging of measurements shall utilize an arithmetic mean unless otherwise specified by the Director in the permit.

7. **Twenty-Four Hour Reporting**
   a. The permittee shall report any noncompliance which may endanger health or the environment. Any information shall be provided orally within 24 hours from the time the permittee becomes aware of the circumstances. A written submission shall also be provided within 5 days of the time the permittee becomes aware of the circumstances. The written submission shall contain a description of the noncompliance and its cause; the period of noncompliance, including exact dates and times, and if the noncompliance has not been corrected, the anticipated time it is expected to continue; and steps taken or planned to reduce, eliminate, and prevent reoccurrence of the noncompliance. The Director may waive the written report on a case-by-case basis if the oral report has been received within 24 hours.
   b. The following shall be included as information which must be reported within 24 hours:
      (1) Any unanticipated bypass which exceeds any effluent limitation in the permit;
      (2) Any upset which exceeds any effluent limitation in the permit; and,
      (3) Violation of a maximum daily discharge limitation for any of the pollutants listed by the Director in Part II (industrial permits only) of the permit to be reported within 24 hours.

8. **Other Noncompliance**
The permittee shall report all instances of noncompliance not reported under Parts III.D.4 and D.7 and Part I.B (for industrial permits only) at the time monitoring reports are submitted. The reports shall contain the information listed at Part III.D.7.

9. **Other Information**
Where the permittee becomes aware that it failed to submit any relevant facts in a permit application, or submitted incorrect information in a permit application or in any report to the Director, it shall promptly submit such facts or information.

10. **Changes in Discharges of Toxic Substances (Applicable to Industrial Permits Only)**
The permittee shall notify the Director as soon as it knows or has reason to believe:
   a. That any activity has occurred or will occur which would result in the discharge, on a routine or frequent basis, of any toxic pollutant which is not limited in the permit, if that discharge will exceed the highest of the "notification levels" described in 40 CFR Part 122.42(a) (1).
   b. That any activity has occurred or will occur which would result in any discharge, on a non-routine or infrequent basis, of a toxic pollutant which is not limited in the permit, if that discharge will exceed the highest of the "notification levels" described in 40 CFR Part 122.42(a) (2).

11. **Signatory Requirements**
All applications, reports, or information submitted to the Director shall be signed and certified.
   a. All permit applications shall be signed as follows:
      (1) For a corporation - by a responsible corporate officer. For the purpose of this section, a responsible corporate officer means:
         (a) A president, secretary, treasurer, or vice-president of the corporation in charge of a principal business function, or any other person who performs similar policy or decision making functions for the corporation; or,
         (b) The manager of one or more manufacturing, production, or operating facilities employing more than 250 persons or having gross annual sales or expenditures exceeding $25 million (in second-quarter 1980 dollars). If authority to sign documents has been assigned or delegated to the manager in accordance with corporate procedures.
      (2) For a partnership or sole proprietorship - by a general partner or the proprietor, respectively.
      (3) For a municipality, State, Federal, or other public agency - by either a principal executive officer or ranking elected official. For purposes of this section, a principal executive officer of a Federal agency includes:
         (a) The chief executive officer of the agency, or
         (b) A senior executive officer having responsibility for the overall operations of a principal geographic unit of the agency.
   b. All reports required by the permit and other information requested by the Director shall be signed by a person described above or by a duly authorized representative of that person. A person is a duly authorized representative only if:
      (1) The authorization is made in writing by a person described above;
      (2) The authorization specifies either an individual or a position having responsibility for the overall operation of the regulated facility or activity, such as the position of plant manager, operator of a well or a well field, superintendent, or position of equivalent responsibility, or an individual or

position having overall responsibility for environmental matters for the company. A duly authorized representative may thus be either a named individual or an individual occupying a named position; and,

(3) The written authorization is submitted to the Director.

c. **Certification.** Any person signing a document under this section shall make the following certification:

"I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."

12. **Availability of Reports**

Except for applications, effluent data, permits, and other data specified in 40 CFR 122.7, any information submitted pursuant to this permit may be claimed as confidential by the submitter. If no claim is made at the time of submission, information may be made available to the public without further notice.

SECTION E. PENALTIES FOR VIOLATIONS OF PERMIT CONDITIONS

1. **Criminal**

a. **Negligent Violations**

The Act provides that any person who negligently violates permit conditions implementing Sections 301, 302, 306, 307, 308, 318, or 405 of the Act is subject to a fine of not less than $2,500 nor more than $25,000 per day of violation, or by imprisonment for not more than 1 year, or both.

b. **Knowing Violations**

The Act provides that any person who knowingly violates permit conditions implementing Sections 301, 302, 306, 307, 308, 318, or 405 of the Act is subject to a fine of not less than $5,000 nor more than $50,000 per day of violation, or by imprisonment for not more than 3 years, or both.

c. **Knowing Endangerment**

The Act provides that any person who knowingly violates permit conditions implementing Sections 301, 302, 303, 306, 307, 308, 318, or 405 of the Act and who knows at that time that he is placing another person in imminent danger of death or serious bodily injury is subject to a fine of not more than $250,000, or by imprisonment for not more than 15 years, or both.

d. **False Statements**

The Act provides that any person who knowingly makes any false material statement, representation, or certification in any application, record, report, plan, or other document filed or required to be maintained under the Act or who knowingly falsifies, tampers with, or renders inaccurate, any monitoring device or method required to be maintained under the Act, shall upon conviction, be punished by a fine of not more than $10,000, or by imprisonment for not more than 2 years, or by both. If a conviction of a person is for a violation committed after a first conviction of such person under this paragraph, punishment shall be by a fine of not more than $20,000 per day of violation, or by imprisonment of not more than 4 years, or by both. (See Section 309.c.4 of the Clean Water Act)

2. **Civil Penalties**

The Act provides that any person who violates a permit condition implementing Sections 301, 302, 306, 307, 308, 318, or 405 of the Act is subject to a civil penalty not to exceed $25,000 per day for each violation.

3. **Administrative Penalties**

The Act provides that any person who violates a permit condition implementing Sections 301, 302, 306, 307, 308, 318, or 405 of the Act is subject to an administrative penalty, as follows:

a. **Class I Penalty**

Not to exceed $10,000 per violation nor shall the maximum amount exceed $25,000.

b. **Class II Penalty**

Not to exceed $10,000 per day for each day during which the violation continues nor shall the maximum amount exceed $125,000.

SECTION F. DEFINITIONS

All definitions contained in Section 502 of the Act shall apply to this permit and are incorporated herein by reference. Unless otherwise specified in this permit, additional definitions of words or phrases used in this permit are as follows:

1. "**Act**" means the Clean Water Act (33 U.S.C. 1251 et. seq.), as amended.
2. "**Administrator**" means the Administrator of the U.S. Environmental Protection Agency.
3. "**Applicable effluent standards and limitations**" means all state and Federal effluent standards and limitations to which a discharge is subject under the Act, including, but not limited to, effluent limitations, standards of performance, toxic effluent standards and prohibitions, and pretreatment standards.
4. "**Applicable water quality standards**" means all water quality standards to which a discharge is subject under the Act and which have been (a) approved or permitted to remain in effect by the Administrator following submission to him/her, pursuant to Section 303(a) of the Act, or (b) promulgated by the Administrator pursuant to Section 303(b) or 303(c) of the Act.
5. "**Bypass**" means the intentional diversion of waste streams from any portion of a treatment facility.
6. "**Daily Discharge**" means the discharge of a pollutant measured during a calendar day or any 24-hour period that reasonably represents the calendar day for purposes of sampling. For pollutants with limitations expressed in terms of mass, the "daily discharge" is calculated as the total mass of the pollutant

discharged over the sampling day. For pollutants with limitations expressed in other units of measurement, the "daily discharge" is calculated as the average measurement of the pollutant over the sampling day. "Daily discharge" determination of concentration made using a composite sample shall be the concentration of the composite sample. When grab samples are used, the "daily discharge" determination of concentration shall be the arithmetic average (weighted by flow value) of all samples collected during that sampling day.

7. **"Daily Average"** (also known as monthly average) discharge limitation means the highest allowable average of "daily discharge(s)" over a calendar month, calculated as the sum of all "daily discharge(s)" measured during a calendar month divided by the number of "daily discharge(s)" measured during that month. When the permit establishes daily average concentration effluent limitations or conditions, the daily average concentration means the arithmetic average (weighted by flow) of all "daily discharge(s)" of concentration determined during the calendar month.
8. **"Daily Maximum"** discharge limitation means the highest allowable "daily discharge" during the calendar month.
9. **"Environmental Protection Agency"** means the U.S. Environmental Protection Agency.
10. **"Grab sample"** means an individual sample collected in less than 15 minutes.
11. **"Industrial user"** means a nondomestic discharger, as identified in 40 CFR 403, introducing pollutants to a publicly owned treatment works.
12. **"National Pollutant Discharge Elimination System"** means the national program for issuing, modifying, revoking and reissuing, terminating, monitoring and enforcing permits, and imposing and enforcing pretreatment requirements, under Sections 307, 318, 402, and 405 of the Act.
13. **"Severe property damage"** means substantial physical damage to property, damage to the treatment facilities which causes them to become inoperable, or substantial and permanent loss of natural resources which can reasonably be expected to occur in the absence of a bypass. Severe property damage does not mean economic loss caused by delays in production.
14. **"Sewage sludge"** means the solids, residues, and precipitates separated from or created in sewage by the unit processes of a publicly owned treatment works. Sewage as used in this definition means any wastes, including wastes from humans, households, commercial establishments, industries, and storm water runoff, that are discharged to or otherwise enter a publicly owned treatment works.
15. **"Treatment works"** means any devices and systems used in the storage, treatment, recycling and reclamation of municipal sewage and industrial wastes of a liquid nature to implement Section 201 of the Act, or necessary to recycle or reuse water at the most economical cost over the estimated life of the works, including intercepting sewers, sewage collection systems, pumping, power and other equipment, and their appurtenances, extension, improvement, remodeling, additions, and alterations thereof; elements essential to provide a reliable recycled supply such as standby treatment units and clear well facilities, and any works, including site acquisition of the land that will be an integral part of the treatment process or is used for ultimate disposal of residues resulting from such treatment.
16. **"Upset"** means an exceptional incident in which there is unintentional and temporary noncompliance with technology-based permit effluent limitations because of factors beyond the reasonable control of the permittee. An upset does not include noncompliance to the extent caused by operational error, improperly designed treatment facilities, inadequate treatment facilities, lack of preventive maintenance, or careless or improper operation.
17. For fecal coliform bacteria a sample consists of one effluent grab portion collected during a 24-hour period at peak loads.
18. The term **"MGD"** shall mean million gallons per day.
19. The term **"mg/l"** shall mean milligrams per liter or parts per million (ppm).
20. The term **"ug/l"** shall mean micrograms per liter or parts per billion (ppb).
21. **Municipal Terms:**
    a. **"7-day average"**, other than for fecal coliform bacteria, is the arithmetic mean of the daily values for all effluent samples collected during a calendar week, calculated as the sum of all daily discharges measured during a calendar week divided by the number of daily discharges measured during that week. The 7-day average for fecal coliform bacteria is the geometric mean of the values for all effluent samples collected during a calendar week.
    b. **"30-day average"**, other than for fecal coliform bacteria, is the arithmetic mean of the daily values for all effluent samples collected during a calendar month, calculated as the sum of all daily discharges measured during a calendar month divided by the number of daily discharges measured during that month. The 30-day average for fecal coliform bacteria is the geometric mean of the values for all effluent samples collected during a calendar month.
    c. **"24-hour composite sample"** consists of a minimum of 12 effluent portions collected at equal time intervals and combined proportional to flow or a sample collected proportional to flow over the 24-hour period where no single aliquot represents more than 4 percent of the expected average daily flow.
    d. **"12-hour composite sample"** consists of 12 effluent portions collected no closer together than one hour and composited according to flow.
    e. **"6-hour composite sample"** consists of six effluent portions collected no closer together than one hour (with the first portion collected no earlier than 10:00 a.m.) and composited according to flow.
    f. **"3-hour composite sample"** consists of three effluent portions collected no closer together than one hour (with the first portion collected no earlier than 10:00 a.m.) and composited according to flow.

rev. 10/1/87

CITY OF OKLAHOMA CITY

SEAL OF THE CITY OF OKLAHOMA CITY

DEPARTMENT OF WATER AND WASTEWATER UTILITIES

CATEGORICAL INDUSTRIAL WASTEWATER DISCHARGE PERMIT

In accordance with Chapters 41 and 47, of the Oklahoma City Code, establishing industrial pretreatment and sewer use requirements as required by City, State, and Federal Statutes and Regulations, a Categorical Industrial Wastewater Discharge Permit, (Number 0029-C), is Hereby Granted To:

PERMITTEE: TINKER AIR FORCE BASE

ADDRESS: OKLAHOMA CITY AIR LOGISTICS CENTER

ENVIRONMENTAL MGMT 73145 SIC CODE 9711

with authorization to discharge industrial wastewater with constituents whose concentrations are regulated by the Oklahoma City Code, Chapters 41 and 47, to the Oklahoma City sanitary sewerage collection and treatment system in a manner that complies with any applicable provisions of City, State, and Federal laws regulating discharge limits on industrial wastewater.

This permit is granted in accordance with the application filed on January 7th, 19 87 in the office of the Director of Water and Wastewater Utilities, 100 N. Walker, 4th Floor, and in conformity with plans, specifications and other data submitted to the City of Oklahoma City in support of the above application, all of which are filed with and considered as part of this permit, together with the attached conditions and requirements.

Effective this 1st day of September, 1992

To Expire 31st day of August, 1993

Permitting Authority:

CITY OF OKLAHOMA CITY WATER & WASTEWATER UTILITIES DEPARTMENT

Name: [signature]

Title: Director of Water & Wastewater Utilities

FEDERAL CATEGORICAL INDUSTRIAL WASTEWATER DISCHARGE PERMIT

Permit No. 029-C
SIC Code 9711

Permittee: Tinker Air Force Base

Permit Conditions
Contents

Permit No. 0029-C
SIC Code 9711

OKLAHOMA CITY WATER & WASTEWATER UTILITIES

Charges and Fees

FOR

Implementation of Industrial Waste Pretreatment Program

It is the purpose of this ordinance to provide for the recovery of cost from Users of the City's wastewater disposal system for the implementation of the program established herein. The applicable charges or fees are set forth in the City's Schedule of Charges and Fees as follows:

Sewer User Charges

1. The sewer user charge effective October 1, 1992 shall be two dollars and thirteen cents ($2.13) per one thousand (1,000) gallons of water as determined from the meter records of the Water Utilities Department. Non-residential accounts shall have said user charge applied to total water consumption or to the effluent from the establishment, if an approved metering system is installed.

2. The surcharge for industrial users shall be calculated and imposed according to the following schedule:

The surcharge is one dollar and seventy cents ($1.70) per one (1) million gallons for each milligram per liter (mg/L) of B.O.D. in excess of two hundred and fifty milligrams per liter (250 mg/L), and one dollar and twelve cents ($1.12) per one (1) million gallons for each milligram per liter (mg/L) of Total Suspended Solids in excess of three hundred milligrams per liter (300 mg/L).

3. Schedule of Fees

Item	Schedule of Fees	Annual Cost
A.	Categorical Pollutant Discharge Permit (New)	$500.00
B.	Categorical Pollutant Discharge Permit (Renewal, Existing, Modified)	250.00
C.	Non-Categorical Pollutant Discharge Permit (New)	50.00
D.	Non-Categorical Pollutant Discharge Permit (Renewal)	25.00
E.	Filing Appeals	25.00
F.	Categorical Pollutant Permit (Potential to Discharge, New)	250.00
G.	Categorical Pollutant Permit (Potential to Discharge, Renewal, Modified)	125.00
H.	Private Water/Sewer Meter Inspection (Verification/Reverification)	50.00
I.	Emergency Industrial Waste Disposal Inspection	50.00
J.	Requested Categorical Pretreatment Facility Inspection	50.00
K.	Duplication of an approved Permit	10.00
L.	Reproduction of Federal Regulations/other requested material	0.25/8-1/2x11 ea 0.35/8-1/2x14 ea

4. The City may adopt additional Charges and Fees; for (1) consistent removal by the City of pollutants otherwise subject to Federal Pretreatment Standards, and (2) other fees as the City may deem necessary to carry out the requirements of the Pretreatment Program.

FEDERAL CATEGORICAL INDUSTRIAL WASTEWATER DISCHARGE PERMIT

B. DISCHARGE LIMITS:

1. Permittee's Discharge Limits

The quality of the permittee's industrial discharges will be limited by General Pretreatment Regulations set forth in Federal Pretreatment Regulations which include the following numerical limitations:

Pollutant or Pollutant Property	Maximum Allowable Concentration, mg/L	Average Concentration and/or Load mg/L or lb/day

2. Specific Pollutant Limitations

Permittee is authorized to discharge pollutants specified in accordance with Section 2.4 as designated under provisions of Oklahoma City Ordinance # 17,501.

2.4 Specific Pollutant Limitations - No person shall discharge wastewater containing in excess of:

0.5 mg/l arsenic
0.5 mg/l cadmium
2.0 mg/l copper
0.5 mg/l cyanide
0.4 mg/l lead
0.05 mg/l mercury
1.8 mg/l nickel
0.5 mg/l silver
1.6 mg/l chromium, total
0.09 mg/l chromium, hexavalent
1.5 mg/l zinc
2.0 mg/l phenolic compounds which cannot be removed by the City's wastewater treatment processes
750 mg/l $B.O.D._5$
750 mg/l suspended solids
100 mg/l pertoleum based oil and grease
200 mg/l animal based oil and grease

106331

[redacted]

3. General Discharge Prohibitions

Permittee shall not discharge or cause to be discharged any pollutant specified as a provision designated under Section 2.1 of Oklahoma City Ordinance # 17,501 and regulated by General Pretreatment Regulations.

2.1 General Discharge Prohibitions

No User shall contribute or cause to be contributed, directly or indirectly, any pollutant, wastewater or substance which either singularly or by interaction with other substances will interfere with the operation or performance of the Municipal Wastewater Collection and Treatment System. These general prohibitions apply to whether or not the User is subject to National Categorical Pretreatment Standards or any other National, State, or local Pretreatment Standards or Requirements. A User may not contribute the following substances to any Municipal Wastewater Collection and Treatment System:

a. (1) Any liquids, solids or gases which by reason of their nature or quantity are, or may be, determined by the City to be sufficient either alone or by interaction with other substances to cause fire or explosion or be injurious in any other way to the Municipal Wastewater Collection and Treatment System or to the operation of the Municipal Wastewater Collection and Treatment System. (2) At no time, shall two successive readings on an explosion hazard meter, at the point of discharge into the system (or at any point in the system) be more than five percent (5%) nor any single reading over ten percent (10%) of the Lower Explosive Limit (LEL) of the meter. (3) Prohibited materials include, but are not limited to, gasoline, kerosene, naphtha, benzene, toluene, xylene, ethers, alcohols, ketones, aldehydes, peroxides, chlorates, perchlorates, bromates, carbides, hydrides and sulfides and any other substances which the City, the State, or EPA has notified the User is a fire hazard or a hazard to the system.

b. Solid or viscous substances which may cause obstruction to the flow in a sewer or other interference with the operation of the wastewater treatment facilities such as, but not limited to: grease, particles greater than one-half inch (½") in any dimension, animal guts or tissues, paunch manure, bones, hair, hides or fleshings, entrails, whole blood, feathers, ashes, cinders, sand, spent lime, stone or marble dust, metal, glass, straw, shavings, grass clippings, rags, spent grains, spent hops, waste paper, wood, plastics, gas, tar, asphalt residues, residues from refining, or processing of fuel or lubricating oil, mud, or glass grinding or polishing wastes.

c. Any wastewater having a pH less than 5.0 or greater than 10.5, unless the POTW is specifically designed to accommodate such wastewater, or wastewater having any other corrosive property, either singularly or by intersection with other substances, capable of causing damage or hazard to structures, equipment, and/or personnel of the Municipal Wastewater Collection and Treatment System.

d. Any wastewater containing toxic pollutants in sufficient quantity, either singly or by interaction with other substances, to injure or interfere with any wastewater treatment process, constitute a hazard to humans or animals, create a toxic effect in the receiving waters of the Municipal Wastewater Collection and Treatment System, or to exceed the limitation set forth in a Categorical Pretreatment Standard. A toxic pollutant shall include but not be limited to any pollutant identified pursuant to Section 307(a) of the Act.

B. 3. e. Any noxious or malodorous liquids, gases, or solids which either singly or by interaction with other substances are sufficient to create a public nuisance or hazard to life or are sufficient to prevent entry into the sewers for maintenance and repair.

f. Any substance which, either singularly or by interaction with other substances, may cause the Municipal Wastewater Collection and Treatment System's effluent or any other product of the Municipal Wastewater Collection and Treatment System, including, but not limited to, residues, sludges, or scums, to be unsuitable for reclamation and reuse or to interfere with the reclamation process. In no case, shall a substance discharged to the Municipal Wastewater Collection and Treatment System cause the Municipal Wastewater Collection and Treatment System to be in non-compliance with sludge use or disposal criteria, guidelines or regulations developed under Section 405 of the Act; any criteria, guidelines, or regulations affecting sludge use or disposal developed pursuant to the Solid Waste Disposal Act, the Clean Air Act, the Toxic Substances Control Act, or State criteria applicable to the sludge management method being utilized.

g. Any substance which, either singularly or by interaction with other substances or pollutants, will cause the POTW to violate its NPDES and/or State Disposal System Permit or the receiving water quality standards.

h. Any wastewater with objectionable color not removed in the treatment process, such as, but not limited to, dye wastes and vegetable tanning solutions.

i. Any wastewater having a temperature which will inhibit biological activity in the Municipal Wastewater Collection and Treatment System resulting in interference, but in no case shall wastewater with a temperature at the introduction into the Municipal Wastewater Collection and Treatment System exceed 40°C (104°F) unless the Municipal Wastewater Collection and Treatment System is designed to accommodate such temperature.

j. Any substance, including oxygen demanding pollutants released at a flow rate and/or in a concentration which a user knows or has reason to know will cause interference to the Municipal Wastewater Collection and Treatment System. In no case shall a slug load have a flow rate or contain concentration or qualities of pollutants that exceed for any time period longer than fifteen (15) minutes more than five (5) times the average twenty-four (24) hour concentration, quantities, or flow during normal operation.

k. Any substance containing any radioactive wastes or isotopes of such halflife or concentration as may exceed limits established by the Director of Water Resources in compliance with applicable State or Federal regulations.

l. Any substance which causes a hazard to human life or creates a public nuisnace. When the Director of Water Resources determines that a User(s) is contributing to the Municipal Wastewater Collection and Treatment System, any of the above enumerated substances in such amounts as to interfere with the operation of the Municipal Wastewater Collection and Treatment System, the Director of Water Resources shall: 1) Advise the User(s) of the impact of the contribution on the Municipal Wastewater Collection and Treatment System; and 2) Inform said User has two (2) days to correct the interference with the Municipal Wastewater Collection and Treatment System.

J. 3. 2.2 Federal Categorical Pretreatment Standards

Upon the promulgation of the Federal Categorical Pretreatment Standards for a particular industrial subcategory, the Federal Standard, if more stringent than limitations imposed under this ordinance for sources in that subcategory, shall immediately supersede the limitations imposed under this ordinance. The Director of Water Resources shall notify all affected Users of any change in the applicable reporting requirements under 40 CFR, Section 403.12.

C. FLOW DISCHARGE REGULATIONS:

Permittee shall not increase the use of process water or, in any way, attempt to dilute a discharge as a partial or complete substitute for adequate treatment to achieve compliance with the limitations contained in the Federal Categorical Pretreatment Standards, or in any other substances limitation developed by the City or State. However, dilution may be an acceptable means of complying with the pH prohibition. Permittee shall not connect or cause to be connected the downspout or conduits draining storm or rain water from the roofs, premises or other places or buildings, or uncontaminated cooling water or unpolluted industrial process water, storm water, surface or subsurface water, rain water, or any water whatsoever into such sanitary sewers. Water from swimming pools, boiler drains, blow-off pipes or cooling water from various equipment may be discharged into the sanitary sewer by an indirect connection whereby such discharge is cooled if required, and flows into the sanitary sewer at a rate not to exceed the capacity of the sanitary sewer, provided the waste does not contain materials or substances in suspension or solution in violation of the limits prescribed by Federal Statutes or State and City regulations, and provided further that said water from an air conditioning or cooling unit shall in no event exceed one-tenth (0.10) gallon per minute per ton capacity of the unit. Any water added for the purpose of diluting wastes that would otherwise exceed applicable maximum concentration limitations is prohibited.

D. MONITORING FACILITIES:

Permittee shall provide at his own expense monitoring facilities to allow inspection, sampling, and flow measurement of the building sewer and/or internal drainage systems. The monitoring facility should normally be situated on the User's premises, but City may, when such a location would be impractical or cause undue hardship on the user, allow the facility to be constructed in the public street or sidewalk area and located so that it will not be obstructed by landscaping or parked vehicles.

There should be ample room in or near such sampling manhole or facility to allow accurate sampling and preparation of samples for analysis. The facility, sampling, and measuring equipment shall be maintained at all times in a safe and proper operating condition at the expense of the User.

Whether constructed on public or private property, the sampling and monitoring facilities shall be provided in accordance with the City's requirements and all applicalbe local construction standards and specifications. Construction shall be completed within ninety (90) days following written notification by the City.

D. 1. Inspection and Sampling

Permittee shall cooperate with the City's authorized representative(s). The City shall inspect the Permittee's facilities to ascertain whether the conditions and requirements of this permit are being met. Persons or occupants of premises where wastewater is created or discharged shall allow the City or their representative ready access at all reasonable times to all parts of the premises for the purposes of inspection, sampling, records examination or in the performance of any of their duties. The City, Approval Authority, and EPA, where the National Pollutant Discharge Elimination System State is the Approval Authority, shall have the right to set up on the User's property such devices as are necessary to conduct sampling inspection, compliance monitoring and/or metering operations. Where a User has security measures in force which

D. 1. Inspection and Sampling, cont.

would require proper identification and clearance before entry into their premises, the User shall make necessary arrangements with their security guards so that upon presentation of suitable identification, personnel from the City, Approval Authority, and EPA will be permitted to enter, without delay, for the purposes of performing their specific responsibilities.

E. MONITORING SCHEDULE:

1. Permittee shall monitor the O'Club line, wastewater meter #65627, during the months of June and December for Biochemical Oxygen Demand (BOD, 5-day); Total Suspended Solids (TSS); Oil and Grease (of petroleum origin); Oil and Grease (of animal origin); Phenol; Benzidine; 1,1,1-Trichloroethane; Methylene Chloride; Methyl Chloride; Tetrachloroethylene; Toluene; Cyanide (T); Lead (T); Mercury (T); Flow; and pH.

2. Permittee shall monitor the Elementry School line, wastewater meter #67102, during the month of December for Biochemical Oxygen Demand (BOD, 5-day); Total Suspended Solids (TSS); Oil and Grease (of petroleum origin); Oil and Grease (of animal origin); Flow; and pH.

3. Permittee shall monitor during the months of June and December for Total Toxic Organics or submit a certified statement that no Total Toxic Organics have been discharged since the previous reporting period and update the Total Toxic Organic Management Plan on file with the City.

4. Analysis shall be performed by an approved certified wastewater laboratory.

5. Permittee or permittee's certified laboratory shall notify the City, in writing, fourteen (14) working days before sample collection. The City reserves the right to monitor such sampling at its discretion.

6. Permittee or permittee's certified laboratory shall collect the samples at the discharge point of the regulated process before mixing with any other waste being discharged to the City sanitary sewer. The samples shall be a composite of, at least, one (1) grab sample per hour collected during a normal work day. The samples shall be collected and preserved according to City and Federal regulations.

7. Permittee or permittee's certified laboratory shall submit to the City a certified statement that the samples were collected according to City and Federal regulations. The statement shall contain the name(s) and signature(s) of the person(s) who collected the sample and any other person(s) who handles the sample(s), date(s), time(s) of sample(s) collection, flow rate during sampling, preservatives used, sample type, pollutant analysis, methodology used, and the person(s) who performed the analysis.

8. Permittee or permittee's certified laboratory shall split the samples with the City, if the City so desires.

9. Permittee may monitor once during the reporting period if permittee is aware of the statistical possibility of violations regarding the monthly average. Permittee may sample upto thirty-one (31) times per month, however, ten (10) times per month is recommended. Should permittee be found to be in violation, the City may determine the sampling frequency and/or number of pollutants to be sampled and analyzed.

E. MONITORING SCHEDULE: (cont.)

10. Permittee shall retain copies of all records relating to wastewater discharge as specified by the City and affording the City access thereto, for a period of at least three (3) years.

11. Permittee shall contact the City's Industrial Waste Pretreatment Section at (405) ~~231-2564~~ regarding any portion of this section.

232-2652
232-9497

F. COMPLIANCE SCHEDULE:

F. 1. Pretreatment

Permittee shall provide necessary wastewater treatment as required to comply with Chapter 41 of the Oklahoma City Code, revised 1980, and shall achieve compliance with all Federal Categorical Pretreatment Standards within the time limitations as specified by the Federal Pretreatment Regulations. Any facilities required to pretreat wastewater to a level acceptable to the City shall be provided, operated, and maintained at the User's expense. Detailed plans showing the pretreatment facilities and operating procedures shall be submitted to the City for review, and shall be acceptable to the City before construction of the facility. The review of such plans and operating procedures will in no way relieve the User from the responsibility of modifying the facility as necessary to produce an effluent acceptable to the City under the provisions of Chapter 41 of the Oklahoma City Code, revised 1980. Any subsequent changes in the pretreatment facilities or method of operation shall be reported to and be acceptable to the City prior to the User's initiation of the changes.

G. REQUIREMENTS FOR REPORTING:

Permittee shall comply with reporting requirements specified as a provision of Oklahoma City Ordinance 17,501 designated herein:

G. 1. Compliance Data Report

Within ninety (90) days following the date for final compliance with applicable Pretreatment Standards or, in the case of a New Source, following commencement of the introduction of wastewater into the Municipal Wastewater Collection and Treatment System, any User subject to Pretreatment Standards and Requirements shall submit to the Director of Water Resources a report indicating the nature and concentration of all pollutants in the discharge from the regulated process which are limited by Pretreatment Standards and Requirements and the average and maximum daily flow for these process units in the User facility which are limited by such Pretreatment Standards or Requirements. The report shall state whether the applicable Pretreatment Standards or Requirements are being met on a consistent basis and, if not, what additional operation and maintenance and/or pretreatment is necessary to bring the User into compliance with the applicable Pretreatment Standards or Requirements. This statement shall be signed by an authorized representative of the Industrial User, and certified to by a qualified professional.

G. 2. Periodic Compliance Reports

Any User subject to a Pretreatment Standard, after the compliance date of such Pretreatment Standard, or, in the case of a New Source, after commencement of the discharge into the Municipal Wastewater Collection and Treatment System, shall submit to the Director of Water Resources during the months of June and December, unless required more frequently in the Pretreatment Standard or by the Director of Water Resources, a report indicating the nature and concentration, of pollutants in the effluent which are limited by such Pretreatment Standards. In addition, this report shall include a record of all daily flows which during the reporting period exceeded the average daily flow reported in this section. At the discretion of the Director of Water Resources and in consideration of such factors as local high or low flow rates, holidays, budget cycles, etc., the Director of Water Resources may agree to alter the months during which the above reports are to be submitted.

G. 3. Mass Limitations

The Director of Water Resources may impose mass limitations if Permittee uses dilution to meet applicable Pretreatment Standards or Requirements, or in other cases where the imposition of mass limitations are appropriate. In such cases, the reports required shall indicate the mass of pollutants regulated by Pretreatment Standards in the effluent of the User. These reports shall contain the results of sampling and analysis of the discharge, including the flow and the nature and concentration, or production and mass, where requested by the Director of Water Resources, of pollutants contained therein which are limited by the applicable Pretreatment Standards. The frequency of monitoring shall be prescribed in the applicable Pretreatment Standard. All analysis shall be performed in accordance with procedures established by the EPA Administrator pursuant to section 304(g) of the Clean Water Act and contained in 40 CFR, Part 136, and amendments thereto, or with any other test procedures approved by the EPA Administrator. Sampling shall be performed in accordance with the techniques approved by the EPA Administrator. Where 40 CFR, Section 136 does not include a sampling or analytical technique for the pollutant in question sampling and analysis shall be performed in accordance with the procedures set forth in the Environmental Protection Agency publication, Sampling and Analysis Procedures for Screening of Industrial Effluents for Priority Pollutants, April, 1977, and amendments thereto, or with any other sampling and analytical procedures approved by the EPA Administrator.

4. Accidental Discharges

Permittee shall provide facilities which the City deems adequate to protect the Municipal Wastewater Collection and Treatment System from accidental discharge of prohibited materials or other substances regulated by this ordinance. Facilities to prevent accidental discharge of prohibited materials shall be provided and maintained at the owner or user's own cost and expense. Detailed plans showing facilities and operating procedures to provide this protection shall be submitted to the City for review, and shall be approved by the City before construction of the facility. All existing Users shall complete such within ninety (90) days of the initial approval of this ordinance by the Environmental Protection Agency. No user who commences contribution to the Municipal Wastewater Collection and Treatment System after the initial approval of this ordinance by the Environmental Protection Agency shall be permitted to introduce substances into the system until accidental discharge procedures have been approved by the City. Review and approval of such plans and operating procedures shall not relieve the industrial user from the responsibility to modify the user's facility as necessary to meet the requirements of this ordinance. In the case of an accidental discharge, it is the responsibility of the User to immediately telephone and notify the Director of Water Resources or his designated representative of the incident. The notification shall include date, time, and location of discharge, type of waste, concentration and volume, and corrective actions.

Written Notice: Within five (5) days following an accidental discharge, the User shall submit to the Director of Water Resources a detailed written report describing the cause of the discharge and the measures to be taken by the User to prevent similar future occurrences. Such notification shall not relieve the user of any expense, loss, damage, or other liability which may be incurred as a result of damage to the Municipal Wastewater Collection and Treatment System, fish kills, or any other damage to person or property; nor shall such notification relieve the User of any fines, civil penalties, or other liability which may be imposed by this article or other applicable law.

108340

FEDERAL CATEGORICAL INDUSTRIAL WASTEWATER DISCHARGE PERMIT

H. REQUIREMENTS FOR MAINTAINING RECORDS:

a. Permittee shall maintain all records relating to compliance with Pretreatment Standards and shall be made available upon request to the City and/or the Environmental Protection Agency.

b. Permittee shall retain records of all monitoring information and records of all data used to complete the application for this permit for a period of at least three (3) years from the date of the sample, measurement, report, or application. This period may be extended by request of the Director of Water Resources at any time.

I. REQUIREMENTS FOR NOTIFICATION OF PERMANENT OR TEMPORARY CHANGES IN OPERATION:

Permittee shall notify the City of any changes (permanent or temporary) to the premises or operation that significantly changes the quality or volume of the industrial wastewater discharge, or deviate from the terms and conditions under which this permit is granted, in writing within fifteen (15) working days of the date of commencement. The report shall include any significant changes in flow rates, B.O.D. and suspended solids values or other characteristics of the industrial waste being discharged. In no case are any new connections, inçreased flows, or significant changes in the operation permitted that will cause violation of effulent limitations specified herein.

J. REQUIREMENTS FOR NOTIFICATION OF SLUDGE DISCHARGES:

Permittee shall notify the City with a detailed written statement in the event of a sewage sludge discharge describing the cause of the discharge and measures taken to prevent any future occurrences within fifteen (15) working days of the date of the occurrence(s). "Sewage sludge" discharge shall mean the solids, residues, and precipitate seperated from or created in sewage by the unit processes of a publicly owned treatment works.

K. SPECIAL CONDITIONS:

1. Permits Duration

Permits shall be issued for a specified time period, not to exceed one (1) year. A permit may be issued for a period less than a year or may be stated to expire on a specific date. The User shall apply for permit reissuance a minimum of sixty (60) days prior to the expiration of the User's existing permit. The terms and conditions of the permit may be subject to modification by the City during the term of the permit as limitations or requirements as identified in Section 2 are modified or other just cause exists. The User shall be informed by certified mail of any proposed changes in his permit at least thirty (30) days prior to the effective date of change. Any changes or new conditions in the permit shall include a reasonable time schedule for compliance. Upon determination by the Director of Water Resources that a User's contribution to the POTW has changed or increased, the Director of Water Resources may require User to reapply for a permit or amend User's existing permit.

2. Permit Transfer

Wastewater Discharge Permits are issued to a specific User for a specific operation. A wastewater discharge permit shall not be reassigned or transferred or sold to a new Owner, new User, different premises, or a new or changed operation without the approval of the City. Any succeeding Owner or User shall comply with the terms and conditions of the existing permit.

3. Notification of Violation

Permittee shall be served written notice whenever the City finds that any User has violated or is violating any portion of this ordinance, Wastewater Discharge Permit, or any prohibition, limitation of requirements contained herein, the City may, in addition to criminal citations and fines and civil remedies, serve upon such person a written notice stating the nature of the violation. Within forty-eight (48) hours of the notice, a plan for the satisfactory correction thereof shall be submitted to the Director of Water Resources or his designated representative by the User. Failure of the User to show a plan for the satisfactory correction of the violation and to show that steps are being taken to implement said plan, the Director of Water Resources may temporarily suspend User's Wastewater Discharge Permit and disconnect User from the Municipal Wastewater Treatment System.

4. Revocation of Permit

Permittee who violates the following conditions of this ordinance, or applicable state and federal regulations, is subject to having his permit revoked:

a. Failure of a User to factually report the wastewater constituents and characteristics of his discharge;

b. Failure of the User to report significant changes in operations, or wastewater constituents and characteristics;

c. Refusal of reasonable access to the User's premises for the purpose of inspection or monitoring,

d. Violation of conditions of the permit; or

e. Failure to pay permit fees, charges, and fines.

K. 5. Legal Action

If Permittee discharges sewage, industrial wastes or other wastes into the City's wastewater disposal system contrary to the provisions of this ordinance, Federal or State Pretreatment Requirements, or any order of the City, the City Attorney may commence civil proceedings for appropriate legal and/or equitable relief in the District Court of this county.

6. Penalty - Costs

a. Civil Penalties

If Permittee is found to have violated an Order of the Director of Water Resources, or who willfully or negligently failed to comply with any provision of this ordinance, and the orders, rules, regulations and permits issued hereunder, shall be fined not less than One Hundred Dollars ($100.00), nor more than Five Hundred Dollars ($500.00) for each offense. Each and every day on which a violation shall occur or continue shall be deemed a separate and distinct offense. In addition to the penalties provided herein, the City may recover reasonable attorneys' fees, court costs, court reporters' fees and other expenses of litigation by appropriate suit at law or in equity against the person found to haye violated this ordinance or the orders, rules, regulations, and permits issued hereunder. However, any User who notifies the Director of Water Resources or his designated representative of an accidental discharge within twenty-four hours of the accident and prior to the independent discovery of said discharge by The City shall be fined not more than Two Hundred and Fifty Dollars ($250.00).

b. Falsifying Information

If Permittee knowingly makes any false statements, representation or certification in any application, record, report, plan or other document filed or required to be maintained pursuant to this ordinance, or Wastewater Discharge Permit, or who falsifies, tampers with, or knowingly renders inaccurate any monitoring device or method required under this ordinance, shall, upon conviction, be punished by a fine of not less than One Hundred Dollars ($100.00) nor more than Five Hundred Dollars ($500.00), or by imprisonment for not more than six (6) months, or by both. Each publication or expression of a false statement, representation or certification shall be deemed a separate offense, regardless of whether the contents of said false statement, representation or certification are the same and merely published or expressed at a different time or in a different manner.

c. Harmful Contributions

The City shall suspend the wastewater treatment service and/or a Wastewater Discharge Permit when such suspension is necessary, in the opinion of the Director of Water Resources, in order to stop an actual or threatened discharge which presents or may present an imminent or substantial endangerment to the health or welfare of persons, to the environment, causes Interference to the Municipal Wastewater Collection and Treatment System or causes the City to violate any condition of its National Pollutant Discharge Elimination System Permit.

Any person notified of a suspension of the wastewater treatment service and/or the Wastewater Discharge Permit shall immediately stop or eliminate the contribution. In the event of a failure of the person to comply voluntarily with the suspension order, the City shall take such steps as deemed necessary including immediate severance of the sewer connection, to prevent or minimize damage to the Municipal Wastewater Collection and Treatment System, to terminate the violation of the City's NPDES

A. 6. Penalty - Costs, cont.

permit, or endangerment to the environment or any individuals. The City shall reinstate the Wastewater Discharge Permit and/or the wastewater treatment service upon proof of the elimination of the non-complying discharge and payment of all fines and charges levied in accordance with this ordinance, and all amendments and additions hereto. A detailed written statement submitted by the User describing the causes of the harmful contribution and the measures taken to prevent any future occurrence shall be submitted to the City within fifteen (15) days of the date of occurrence.

OKLAHOMA CITY DEPARTMENT OF WATER RESOURCES

Limitations On Industrial Discharges

1. Any waters or wastes having a pH lower than five (5.0) or greater than ten and one-half (10.5).

2. Any liquid or vapor having a temperature higher than one hundred and four (104) °F or fourty (40) °C.

3. Any cyanide greater than one-half milligram per liter (0.5 mg/l).

4. Any phenol or phenolic material greater than two milligrams per liter (2.0 mg/l).

5. Concentrations of the following greater than the milligram per liter (mg/l) amounts indicated below:

Element	mg/l	Element	mg/l
Arsenic	0.5	Mercury	0.05
Cadmium	0.5	Nickel	1.8
Chromium (hexavalent)	0.09	Lead	0.4
Chromium (total)	1.6	Silver	0.5
Copper	2.0	Zinc	1.5

6. All other heavy metals and toxic substances, including but not limited to the following, shall be excluded from the wastewater system unless a permit specifying the conditions of pretreatment, concentrations, volumes, etc., is obtained from the City: pesticides, rhenium, strontium, tellurium, herbicides, fungicides, or any flouride other than that in the public water supply.

7. Five-day B.O.D. concentration in excess of seven hundred fifty milligrams per liter (750 mg/l).

8. Suspended solids concentration in excess of seven hundred fifty milligrams per liter (750 mg/l).

9. Oil and grease of petroleum origin concentration in excess of one hundred milligrams per liter (100 mg/l).

10. Oil and grease of animal or vegetable origin concentration in excess of two hundred milligrams per liter (200 mg/l).

11. Prohibited materials including but not limited to gasoline, kerosene, naptha, benzene, tolulene, xylene, ethers, alcohols, ketones, aldehydes, peroxides, chlorates, perchlorates, bromates carbides, hydrides and sulfides and any other substances which the City, the State, or EPA has notified the user is a five hazard or a hazard to the system.

12. Federally regulated pollutants (Priority pollutants) shall be discharged in accordance with limits established by Federal regulations for industrial categories subject to Federal discharge standards and pretreatment regulations. Page V shows a listing of these Federally regulated substances (Priority pollutants).

JIS ID:	87019
Permit ID:	87-019
Permit to Install Number:	87-019-C
Permit to Operate Number:	
Registration number:	B3001 O-56
Application number:	
Status:	APPROVED TO CONSTRUCT/INSTALL/MODIFY
Internal Administrative Data:	Ultrasonic vapor dedreaser; HC emissions NTE 2.6 tpy; Freon, Installed, but not operational.
Original Permit Application Date:	/ /
Permit to Install Issue Date:	07/30/87
Installation Completed Date:	/ /
Original Permit to Operate Date:	/ /
Latest Date Permit Amended:	12/27/91
Latest Date Permit Reissued:	/ /
Effective Date of Latest Reissue:	/ /
Date for Permit Inspection/Testing:	/ /
Date Permit Expires:	/ /
Date Renewal Required:	/ /
Date Renewal Submitted:	/ /
Agency Contact Person:	CARLOS NAZZARIO
Agency Contact Person - Telephone:	67246

AQUIS ID:	87021
rmit ID:	87-021
rmit to Install Number:	87-021-C
Permit to Operate Number:	
Registration number:	B 214
Application number:	
Status:	APPROVED TO CONSTRUCT/INSTALL/MODIFY
Internal Administrative Data:	Vapor degreaser with 111 Trich, freon 113, an PD-680; Emissions NTE 1.8 tpy; Installed bu not operational.
Original Permit Application Date:	/ /
Permit to Install Issue Date:	07/15/87
Installation Completed Date:	/ /
Original Permit to Operate Date:	/ /
Latest Date Permit Amended:	12/27/91
Latest Date Permit Reissued:	/ /
Effective Date of Latest Reissue:	/ /
Date for Permit Inspection/Testing:	/ /
Date Permit Expires:	/ /
Date Renewal Required:	/ /
Date Renewal Submitted:	/ /
Agency Contact Person:	CARLOS NAZZARIO
Agency Contact Person - Telephone:	67246

Note: These permits(Pages 1-3) are approved but the facilities are not yet fully operational.

'JIS ID:	90003
. rmit ID:	90-003
Permit to Install Number:	90-003-C
Permit to Operate Number:	
Registration number:	
Application number:	
Status:	APPROVED TO CONSTRUCT/INSTALL/MODIFY
Internal Administrative Data:	B-2 Avionics Repair and Testing Facility; includes paint stripping sink and paint spray booth; DCM NTE 0.85 #/hr. Yearly emission inventory required. Building under construction.
Original Permit Application Date:	/ /
Permit to Install Issue Date:	09/26/90
Installation Completed Date:	/ /
Original Permit to Operate Date:	/ /
Latest Date Permit Amended:	12/27/91
Latest Date Permit Reissued:	/ /
Effective Date of Latest Reissue:	/ /
Date for Permit Inspection/Testing:	/ /
Date Permit Expires:	/ /
Date Renewal Required:	/ /
Date Renewal Submitted:	/ /
Agency Contact Person:	PAUL MCCREDIE
Agency Contact Person - Telephone:	67246

JIS ID:	90017
Permit ID:	90-017
Permit to Install Number:	90-017-C
Permit to Operate Number:	
Registration number:	B 3707
Application number:	
Status:	APPROVED TO CONSTRUCT/INSTALL/MODIFY
Internal Administrative Data:	Paint spray booth and paint stripping booth/sink in the B1-B avionics facility. VOC NTE 8.5 #/hr. Expect to be operational Feb. 92. POC Lee Hayward x62100.
Original Permit Application Date:	/ /
Permit to Install Issue Date:	09/26/90
Installation Completed Date:	/ /
Original Permit to Operate Date:	/ /
Latest Date Permit Amended:	12/27/91
Latest Date Permit Reissued:	/ /
Effective Date of Latest Reissue:	/ /
Date for Permit Inspection/Testing:	/ /
Date Permit Expires:	/ /
Date Renewal Required:	/ /
Date Renewal Submitted:	/ /
Agency Contact Person:	ROGER WADDELL
Agency Contact Person - Telephone:	62617

IS ID:	91019
Permit ID:	91-019
Permit to Install Number:	91-019-C
Permit to Operate Number:	
Registration number:	NAVY E-6A
Application number:	
Status:	APPROVED TO CONSTRUCT/INSTALL/MODIFY
Internal Administrative Data:	One 105,000 gal JP-4 AST (throughput NTE 10.3 mil gal/yr); four 1000 gal UST (JP-4 throughput NTE 12000 gal/yr and mogas throughput NTE 52000 gal/yr). Submerged fill pipes and floating pan required as appropriate.
Original Permit Application Date:	/ /
Permit to Install Issue Date:	08/23/91
Installation Completed Date:	03/01/92
Original Permit to Operate Date:	/ /
Latest Date Permit Amended:	12/27/91
Latest Date Permit Reissued:	/ /
Effective Date of Latest Reissue:	/ /
Date for Permit Inspection/Testing:	/ /
Date Permit Expires:	/ /
Date Renewal Required:	/ /
Date Renewal Submitted:	/ /
Agency Contact Person:	JOHN GRANCHIE COE
Agency Contact Person - Telephone:	93930

AQUIS ID:	91020
Permit ID:	91-020
Permit to Install Number:	91-020-C
Permit to Operate Number:	
Registration number:	NAVY E-6A
Application number:	
Status:	APPROVED TO CONSTRUCT/INSTALL/MODIFY
Internal Administrative Data:	Corrosion Control Branch of E-6A maintenance facility; TMIK NTE 14.625 #/hr, and15.21 tpy; MIK NTE 7.5 #/hr and 14.04 tpy. Opacity NTE 20%.
Original Permit Application Date:	/ /
Permit to Install Issue Date:	08/23/91
Installation Completed Date:	/ /
Original Permit to Operate Date:	/ /
Latest Date Permit Amended:	12/27/91
Latest Date Permit Reissued:	/ /
Effective Date of Latest Reissue:	/ /
Date for Permit Inspection/Testing:	/ /
Date Permit Expires:	/ /
Date Renewal Required:	/ /
Date Renewal Submitted:	/ /
Agency Contact Person:	JOHN GRANCHIE COE
Agency Contact Person - Telephone:	93930

QUIS ID:	78029
ermit ID:	78-029A
Permit to Install Number:	78029A-C
Permit to Operate Number:	78029A-O
Registration number:	B 289
Application number:	SOURCE#51
Status:	APPROVED TO OPERATE
Internal Administrative Data:	PAINT SPRAY BOOTH IN AWAC CORROSION CONTROL FACILITY, B.289.
Original Permit Application Date:	/ /
Permit to Install Issue Date:	08/11/78
Installation Completed Date:	09/01/80
Original Permit to Operate Date:	01/16/81
Latest Date Permit Amended:	/ /
Latest Date Permit Reissued:	/ /
Effective Date of Latest Reissue:	/ /
Date for Permit Inspection/Testing:	/ /
Date Permit Expires:	/ /
Date Renewal Required:	/ /
Date Renewal Submitted:	/ /
Agency Contact Person:	CPT RYDELL
Agency Contact Person - Telephone:	47124

AQUIS ID:	78029
Permit ID:	78-029B
Permit to Install Number:	78-029B-C
rmit to Operate Number:	78-029B-O
Registration number:	B 289
Application number:	
Status:	APPROVED TO OPERATE
Internal Administrative Data:	AWAC: Paint drying room; HC emissions limite to: 1.32tpy, 10.4#/day, 1.7#/hr
Original Permit Application Date:	08/11/78
Permit to Install Issue Date:	09/01/80
Installation Completed Date:	/ /
Original Permit to Operate Date:	01/16/81
Latest Date Permit Amended:	12/26/91
Latest Date Permit Reissued:	/ /
Effective Date of Latest Reissue:	/ /
Date for Permit Inspection/Testing:	/ /
Date Permit Expires:	/ /
Date Renewal Required:	/ /
Date Renewal Submitted:	/ /
Agency Contact Person:	CPT RYDELL
Agency Contact Person - Telephone:	47124

Note: These permits (Pages 1-15) have been approved and the facilities are fully operational.

QUIS ID:	78029
ermit ID:	78-029C
Permit to Install Number:	78-029C-C
Permit to Operate Number:	78-029C-O
Registration number:	B 289
Application number:	
Status:	APPROVED TO OPERATE
Internal Administrative Data:	AWAC: CLEANING AND DEGREASING AREA; SOLVENT USAGE TO BE REPORTED ANNUALLY.
Original Permit Application Date:	/ /
Permit to Install Issue Date:	08/11/78
Installation Completed Date:	09/01/80
Original Permit to Operate Date:	01/16/81
Latest Date Permit Amended:	12/26/91
Latest Date Permit Reissued:	/ /
Effective Date of Latest Reissue:	/ /
Date for Permit Inspection/Testing:	/ /
Date Permit Expires:	/ /
Date Renewal Required:	/ /
Date Renewal Submitted:	/ /
Agency Contact Person:	CPT RYDELL
Agency Contact Person - Telephone:	47124

AQUIS ID:	78029
Permit ID:	78-029D
Permit to Install Number:	78-029D-C
rmit to Operate Number:	78-029D-O
Registration number:	B 289
Application number:	SOURCE#52
Status:	APPROVED TO OPERATE
Internal Administrative Data:	AWAC: PAINT STRIPPING AREA; PAINT STRIPPING SOLVENT USAGE TO BE REPORTED ANNUALLY.
Original Permit Application Date:	/ /
Permit to Install Issue Date:	08/11/78
Installation Completed Date:	09/01/80
Original Permit to Operate Date:	01/16/81
Latest Date Permit Amended:	12/26/91
Latest Date Permit Reissued:	/ /
Effective Date of Latest Reissue:	/ /
Date for Permit Inspection/Testing:	/ /
Date Permit Expires:	/ /
Date Renewal Required:	/ /
Date Renewal Submitted:	/ /
Agency Contact Person:	CPT RYDELL
Agency Contact Person - Telephone:	47124

QUIS ID:	78029
ermit ID:	78-029F
Permit to Install Number:	78-029F-C
Permit to Operate Number:	78-029F-O
Registration number:	B 289 W
Application number:	SR#131,132
Status:	APPROVED TO OPERATE
Internal Administrative Data:	1 50,000gal UST DIESEL; 1 50,000gal UST JP4; 3,000gal UST mogas; annual throughput limitec to 125,700gal mogas
Original Permit Application Date:	/ /
Permit to Install Issue Date:	08/11/78
Installation Completed Date:	09/01/80
Original Permit to Operate Date:	01/16/81
Latest Date Permit Amended:	/ /
Latest Date Permit Reissued:	/ /
Effective Date of Latest Reissue:	/ /
Date for Permit Inspection/Testing:	/ /
Date Permit Expires:	/ /
Date Renewal Required:	/ /
Date Renewal Submitted:	/ /
Agency Contact Person:	CPT RYDELL
Agency Contact Person - Telephone:	47124

AQUIS ID:	80008
Permit ID:	80-008
ermit to Install Number:	80-008-C
Permit to Operate Number:	80-008-O
Registration number:	B3001 O-81
Application number:	
Status:	APPROVED TO OPERATE
Internal Administrative Data:	Seven tanks for cleaning jet engine parts; addition of orthodichlorobenzene and cresol must be reported to OCCHD.
Original Permit Application Date:	02/01/80
Permit to Install Issue Date:	03/14/80
Installation Completed Date:	07/30/80
Original Permit to Operate Date:	01/19/81
Latest Date Permit Amended:	12/26/91
Latest Date Permit Reissued:	/ /
Effective Date of Latest Reissue:	/ /
Date for Permit Inspection/Testing:	/ /
Date Permit Expires:	/ /
Date Renewal Required:	/ /
Date Renewal Submitted:	/ /
Agency Contact Person:	MIKE BLASDALE
Agency Contact Person - Telephone:	62809

QUIS ID:	80009
ermit ID:	80-009
Permit to Install Number:	80-009-C
Permit to Operate Number:	80-009-O
Registration number:	B3001NANNX
Application number:	SOURCE#440
Status:	APPROVED TO OPERATE
Internal Administrative Data:	Jet engine tube cleaning facility; HC emissions limited to 5.48tpy; 1990 emissions was 0.09tons.
Original Permit Application Date:	02/01/80
Permit to Install Issue Date:	03/14/80
Installation Completed Date:	07/30/80
Original Permit to Operate Date:	05/27/81
Latest Date Permit Amended:	/ /
Latest Date Permit Reissued:	/ /
Effective Date of Latest Reissue:	/ /
Date for Permit Inspection/Testing:	/ /
Date Permit Expires:	/ /
Date Renewal Required:	/ /
Date Renewal Submitted:	/ /
Agency Contact Person:	MIKE PATRY
Agency Contact Person - Telephone:	65185

AQUIS ID:	81044
Permit ID:	81-044
ermit to Install Number:	81-044-C
Permit to Operate Number:	81-044-O
Registration number:	B3001Q-107
Application number:	SOURCE#477
Status:	APPROVED TO OPERATE
Internal Administrative Data:	Perch vapor degreaser; hours of operation limited to 1560 hrs/yr. HC emissions NTE 41.07tpy.
Original Permit Application Date:	/ /
Permit to Install Issue Date:	09/09/81
Installation Completed Date:	/ /
Original Permit to Operate Date:	06/12/84
Latest Date Permit Amended:	12/26/91
Latest Date Permit Reissued:	/ /
Effective Date of Latest Reissue:	/ /
Date for Permit Inspection/Testing:	/ /
Date Permit Expires:	/ /
Date Renewal Required:	/ /
Date Renewal Submitted:	/ /
Agency Contact Person:	MIKE BLASDALE
Agency Contact Person - Telephone:	62809

UIS ID:	82015
ermit ID:	82-015
Permit to Install Number:	82-015-C
Permit to Operate Number:	82-015-O
Registration number:	
Application number:	SOURCE#117
Status:	APPROVED TO OPERATE
Internal Administrative Data:	Tank no. 998 and 999; two 105,000 gal AST, floating roof, JP-4; AWAC Alert area,(north end); JP-4 throughput NTE 19,300,000 bbls/yr; HC emissions NTE 0.626tpy. TWO ABOVEGROUND STORAGE TANKS.
Original Permit Application Date:	/ /
Permit to Install Issue Date:	03/31/82
Installation Completed Date:	02/21/92
Original Permit to Operate Date:	02/26/92
Latest Date Permit Amended:	12/26/91
Latest Date Permit Reissued:	/ /
Effective Date of Latest Reissue:	/ /
Date for Permit Inspection/Testing:	/ /
Date Permit Expires:	/ /
Date Renewal Required:	/ /
Date Renewal Submitted:	/ /
Agency Contact Person:	GENE COLVIN
Agency Contact Person - Telephone:	42753

UIS ID:	82051
Permit ID:	82-051
Permit to Install Number:	82-051-C
Permit to Operate Number:	82-051-O
Registration number:	B3001 R-53
Application number:	SOURCE#579
Status:	APPROVED TO OPERATE
Internal Administrative Data:	Paint spray booth in Sheet Metal Mfg subunit; throughput of paints and solvents to be reported on annual emission inventory.
Original Permit Application Date:	/ /
Permit to Install Issue Date:	12/13/82
Installation Completed Date:	/ /
Original Permit to Operate Date:	03/18/85
Latest Date Permit Amended:	12/26/91
Latest Date Permit Reissued:	/ /
Effective Date of Latest Reissue:	/ /
Date for Permit Inspection/Testing:	/ /
Date Permit Expires:	/ /
Date Renewal Required:	/ /
Date Renewal Submitted:	/ /
Agency Contact Person:	CARLOS NAZARIO
Agency Contact Person - Telephone:	67246

AQUIS ID:	85012
Permit ID:	85-012
Permit to Install Number:	85-012-C
Permit to Operate Number:	85-012-O
Registration number:	B 1068
Application number:	SOURCE#056
Status:	APPROVED TO OPERATE
Internal Administrative Data:	507th TFG; DeVilbiss paint booth with water curtain; HC emissions NTE 18.29tpy. 1990 emission was 4.16 tons.
Original Permit Application Date:	/ /
Permit to Install Issue Date:	06/05/85
Installation Completed Date:	/ /
Original Permit to Operate Date:	06/19/85
Latest Date Permit Amended:	12/26/91
Latest Date Permit Reissued:	/ /
Effective Date of Latest Reissue:	/ /
Date for Permit Inspection/Testing:	/ /
Date Permit Expires:	/ /
Date Renewal Required:	/ /
Date Renewal Submitted:	/ /
Agency Contact Person:	MITCH CHANDRIN
Agency Contact Person - Telephone:	42861

AQUIS ID:	85034
Permit ID:	85-034
Permit to Install Number:	85-034-C
Permit to Operate Number:	85-034-O
Registration number:	B 2212
Application number:	SOURCE#011
Status:	APPROVED TO OPERATE
Internal Administrative Data:	Area B heating plant; Three 72,000#/hr steam boilers. NOx NTE 0.2#/mbtu heat input; Operation limited to 2920 hr/yr. Scheduled operational Jan 1992. One of three boilers operational now (31Dec91).
Original Permit Application Date:	/ /
Permit to Install Issue Date:	01/30/86
Installation Completed Date:	02/21/92
Original Permit to Operate Date:	02/26/92
Latest Date Permit Amended:	12/26/91
Latest Date Permit Reissued:	/ /
Effective Date of Latest Reissue:	/ /
Date for Permit Inspection/Testing:	/ /
Date Permit Expires:	/ /
Date Renewal Required:	/ /
Date Renewal Submitted:	/ /
Agency Contact Person:	DON HARRIS
Agency Contact Person - Telephone:	44292

?UIS ID:	87015
ermit ID:	87-015
Permit to Install Number:	87-015-C
Permit to Operate Number:	87-015-O
Registration number:	B 230
Application number:	SOURCE#320
Status:	APPROVED TO OPERATE
Internal Administrative Data:	Paint spray booth with water curtain; HC emissions NTE 4426 #/yr(2.2 tons); Opacit NTE 20%. 1990 emissions were 0.98 tons. AWAC operation.
Original Permit Application Date:	/ /
Permit to Install Issue Date:	05/22/87
Installation Completed Date:	02/21/92
Original Permit to Operate Date:	02/26/92
Latest Date Permit Amended:	12/26/91
Latest Date Permit Reissued:	/ /
Effective Date of Latest Reissue:	/ /
Date for Permit Inspection/Testing:	/ /
Date Permit Expires:	/ /
Date Renewal Required:	/ /
Date Renewal Submitted:	/ /
Agency Contact Person:	CPT MARK RYDELL
Agency Contact Person - Telephone:	47124

AQUIS ID:	87017
ermit ID:	87-017
Permit to Install Number:	87-017-C
Permit to Operate Number:	87-017-O
Registration number:	B 1096
Application number:	SOURCE#068
Status:	APPROVED TO OPERATE
Internal Administrative Data:	8,000 #/day classified waste incinerator; Visible emissions NTE 20% opacity; Particulate emissions NTE 0.004 tpy. Locatic tele. number: 43849
Original Permit Application Date:	09/22/87
Permit to Install Issue Date:	06/05/87
Installation Completed Date:	/ /
Original Permit to Operate Date:	10/21/87
Latest Date Permit Amended:	12/27/91
Latest Date Permit Reissued:	/ /
Effective Date of Latest Reissue:	/ /
Date for Permit Inspection/Testing:	/ /
Date Permit Expires:	/ /
Date Renewal Required:	/ /
Date Renewal Submitted:	/ /
Agency Contact Person:	STEVE GOLD
Agency Contact Person - Telephone:	42633

AQUIS ID:	87032
Permit ID:	87-032
Permit to Install Number:	87-032-C
Permit to Operate Number:	87-032-O
Registration number:	B 2211
Application number:	
Status:	APPROVED TO OPERATE
Internal Administrative Data:	Two stationary electrical gas turbines owned and operated by OG&E; NOx NTE 413 #/mcf NG, or 220 #/hr/unit, or 67.8 #/1000gal fuel oil or 285#/hr/unit; CO emissions NTE 115#/mcf NG or 61.3#/hr/unit. Emission inventory maintained by OG&E.
Original Permit Application Date:	/ /
Permit to Install Issue Date:	11/24/87
Installation Completed Date:	/ /
Original Permit to Operate Date:	09/07/90
Latest Date Permit Amended:	12/27/91
Latest Date Permit Reissued:	/ /
Effective Date of Latest Reissue:	/ /
Date for Permit Inspection/Testing:	/ /
Date Permit Expires:	/ /
Date Renewal Required:	/ /
Date Renewal Submitted:	/ /
Agency Contact Person:	DAVID BRANECKY OG&E
Agency Contact Person - Telephone:	272-3690

AQUIS ID:	88016
Permit ID:	88-016
Permit to Install Number:	88-016-C
Permit to Operate Number:	88-016-O
Registration number:	B 214
Application number:	
Status:	APPROVED TO OPERATE
Internal Administrative Data:	Ultrasonic cleaning system; Emissions NTE 0.007 tpy (combined detergent and caustic alkaline emissions)
Original Permit Application Date:	/ /
Permit to Install Issue Date:	05/24/88
Installation Completed Date:	02/21/92
Original Permit to Operate Date:	02/26/92
Latest Date Permit Amended:	12/27/91
Latest Date Permit Reissued:	/ /
Effective Date of Latest Reissue:	/ /
Date for Permit Inspection/Testing:	/ /
Date Permit Expires:	/ /
Date Renewal Required:	/ /
Date Renewal Submitted:	/ /
Agency Contact Person:	CARLOS NAZZARIO
Agency Contact Person - Telephone:	67246

'UIS ID: 88017
.ermit ID: 88-017
Permit to Install Number: 88-017-C
Permit to Operate Number: 88-017-O
Registration number: B3001 E-91
Application number: SOURCE#493
Status: APPROVED TO OPERATE
Internal Administrative Data: Freon vapor degreaser; Emissions NTE 3.3 tpy(1.6 #/hr); Operating hours limited to 16 hrs/day, 260 days/yr; Records shall be kept o Freon TF throughput for two years. Case Shop.
Original Permit Application Date: / /
Permit to Install Issue Date: 06/10/88
Installation Completed Date: / /
Original Permit to Operate Date: 08/09/90
Latest Date Permit Amended: 12/27/91
Latest Date Permit Reissued: / /
Effective Date of Latest Reissue: / /
Date for Permit Inspection/Testing: / /
Date Permit Expires: / /
Date Renewal Required: / /
Date Renewal Submitted: / /
Agency Contact Person: ROBERT SWIFT
Agency Contact Person - Telephone: 65556

'QUIS ID: 88019
.rmit ID: 88-019
Permit to Install Number: 88-019-C
Permit to Operate Number: 88-019-O
Registration number:
Application number: SOURCE#103
Status: APPROVED TO OPERATE
Internal Administrative Data: NINE ASTs: two 5,000 bbl JP-4; three 1,000 bbl mogas; two 1,000 bbl JP-5; one 1,000 bbl diesel; and one 1,000 bbl PD-680. Throughput NTE: 20,000,000 gal/yr JP-4; 416,000 gal/yr mogas; 96,000 gal/yr JP-5; 192,000 gal/yr PD-680.
Original Permit Application Date: / /
Permit to Install Issue Date: 06/10/88
Installation Completed Date: 02/21/92
Original Permit to Operate Date: 02/26/92
Latest Date Permit Amended: / /
Latest Date Permit Reissued: / /
Effective Date of Latest Reissue: / /
Date for Permit Inspection/Testing: / /
Date Permit Expires: / /
Date Renewal Required: / /
Date Renewal Submitted: / /
Agency Contact Person: GENE COLVIN
Agency Contact Person - Telephone: 42753

QUIS ID:	88026
Permit ID:	88-026
Permit to Install Number:	88-026-C
Permit to Operate Number:	88-026-O
Registration number:	B 2122
Application number:	
Status:	APPROVED TO OPERATE
Internal Administrative Data:	Plastic media paint removal booth; particulat emissions NTE 1.33 TPY.
Original Permit Application Date:	/ /
Permit to Install Issue Date:	09/12/88
Installation Completed Date:	/ /
Original Permit to Operate Date:	03/20/90
Latest Date Permit Amended:	12/27/91
Latest Date Permit Reissued:	/ /
Effective Date of Latest Reissue:	/ /
Date for Permit Inspection/Testing:	/ /
Date Permit Expires:	/ /
Date Renewal Required:	/ /
Date Renewal Submitted:	/ /
Agency Contact Person:	JIM SMITH
Agency Contact Person - Telephone:	67757

AQUIS ID:	88031
Permit ID:	88-031
Permit to Install Number:	88-031-C
Permit to Operate Number:	88-031-O
Registration number:	B3221 K-1
Application number:	SOURCE#496
Status:	APPROVED TO OPERATE
Internal Administrative Data:	Plasma spray cell opacity NTE 20%: 1990 particulate emissons were 0.01 tons POC: Jim HollY, LPPPNA, 62919.
Original Permit Application Date:	/ /
Permit to Install Issue Date:	12/19/88
Installation Completed Date:	02/21/92
Original Permit to Operate Date:	02/26/92
Latest Date Permit Amended:	12/27/91
Latest Date Permit Reissued:	/ /
Effective Date of Latest Reissue:	/ /
Date for Permit Inspection/Testing:	/ /
Date Permit Expires:	/ /
Date Renewal Required:	/ /
Date Renewal Submitted:	/ /
Agency Contact Person:	KIT LEWIS, LPPES
Agency Contact Person - Telephone:	62289

AQUIS ID:	89001
Permit ID:	89-001
Permit to Install Number:	89-001-C
Permit to Operate Number:	89-001-O
Registration number:	B3221 E-4
Application number:	SOURCE#497
Status:	APPROVED TO OPERATE
Internal Administrative Data:	Freon vapor degreaser; VOC emissions NTE 3.45 tpy; 1990 emissions were 2.54 tonsPOC: Jim Holly, LPPPNA, 62919.
Original Permit Application Date:	/ /
Permit to Install Issue Date:	01/13/89
Installation Completed Date:	02/21/92
Original Permit to Operate Date:	02/26/92
Latest Date Permit Amended:	12/27/91
Latest Date Permit Reissued:	/ /
Effective Date of Latest Reissue:	/ /
Date for Permit Inspection/Testing:	/ /
Date Permit Expires:	/ /
Date Renewal Required:	/ /
Date Renewal Submitted:	/ /
Agency Contact Person:	KIT LEWIS, LPPES
Agency Contact Person - Telephone:	62289

AQUIS ID:	89002
Permit ID:	89-002
Permit to Install Number:	89-002-C
Permit to Operate Number:	
Registration number:	B3221
Application number:	SOURCE#491
Status:	APPROVED TO OPERATE
Internal Administrative Data:	Chemical cleaning cell; stack emissions NTE 150% of the annualized tonnage; Emissions NTE MAAC as defined by Oklahoma Clean Air Re 3.8. 1990 emission 0.06tPOC: Kirk Hudson, LPPPNC, 62535.
Original Permit Application Date:	/ /
Permit to Install Issue Date:	02/10/89
Installation Completed Date:	/ /
Original Permit to Operate Date:	11/29/89
Latest Date Permit Amended:	12/27/91
Latest Date Permit Reissued:	/ /
Effective Date of Latest Reissue:	/ /
Date for Permit Inspection/Testing:	/ /
Date Permit Expires:	/ /
Date Renewal Required:	/ /
Date Renewal Submitted:	/ /
Agency Contact Person:	KIT LEWIS, LPPES
Agency Contact Person - Telephone:	62289

UIS ID:	90002
Permit ID:	90-002
Permit to Install Number:	
Permit to Operate Number:	90-002-O
Registration number:	B 3125
Application number:	SOURCE#585
Status:	APPROVED TO OPERATE
Internal Administrative Data:	Barrel cleaning operation; Operation NTE 16 hr/day, 5 days/wk, 50 wks/yr; Toxic emissions NTE Maximum Allowable Ambient Concentration (MAAC). 1990 emissions negligible. FUME SCRUBBER.
Original Permit Application Date:	/ /
Permit to Install Issue Date:	/ /
Installation Completed Date:	/ /
Original Permit to Operate Date:	05/30/90
Latest Date Permit Amended:	12/27/91
Latest Date Permit Reissued:	/ /
Effective Date of Latest Reissue:	/ /
Date for Permit Inspection/Testing:	/ /
Date Permit Expires:	/ /
Date Renewal Required:	/ /
Date Renewal Submitted:	/ /
Agency Contact Person:	BILL BULEY EMCO
Agency Contact Person - Telephone:	42010

UIS ID:	90007
Permit ID:	90-007
Permit to Install Number:	
Permit to Operate Number:	90-007-O
Registration number:	B3001R-111
Application number:	SOURCE#485
Status:	APPROVED TO OPERATE
Internal Administrative Data:	CO2 Blast Machine; Opacity NTE 20%; Particulates NTE 0.1grains/standard cf at 7000CFM.
Original Permit Application Date:	/ /
Permit to Install Issue Date:	/ /
Installation Completed Date:	/ /
Original Permit to Operate Date:	06/14/90
Latest Date Permit Amended:	12/27/91
Latest Date Permit Reissued:	/ /
Effective Date of Latest Reissue:	/ /
Date for Permit Inspection/Testing:	/ /
Date Permit Expires:	/ /
Date Renewal Required:	/ /
Date Renewal Submitted:	/ /
Agency Contact Person:	MIKE PATRY
Agency Contact Person - Telephone:	65185

QUIS ID:	90015
ermit ID:	90-015
Permit to Install Number:	90-015-C
Permit to Operate Number:	90-015-O
Registration number:	B 964
Application number:	
Status:	APPROVED TO OPERATE
Internal Administrative Data:	E3-A maintenance hangar heating plant; two 7. mbtu/hr boilers. Particulates NTE0.6 #/mbtu heat input (Reg 2.4). SO2 NTE 0.2 #/mbtu heat input (Reg 3.4) Opacity NTE 20%.
Original Permit Application Date:	09/05/90
Permit to Install Issue Date:	11/29/90
Installation Completed Date:	01/17/92
Original Permit to Operate Date:	01/29/92
Latest Date Permit Amended:	12/27/91
Latest Date Permit Reissued:	/ /
Effective Date of Latest Reissue:	/ /
Date for Permit Inspection/Testing:	/ /
Date Permit Expires:	/ /
Date Renewal Required:	/ /
Date Renewal Submitted:	/ /
Agency Contact Person:	CPT RYDELL
Agency Contact Person - Telephone:	47124

AQUIS ID:	91018
ermit ID:	91-018
Permit to Install Number:	91-018-C
Permit to Operate Number:	91-018-O
Registration number:	NAVY E-6A
Application number:	
Status:	APPROVED TO OPERATE
Internal Administrative Data:	Construct two 13,800 #/hr and two 4313 #/hr steam boilers; One 20,000 gal UST for No. fue oil. UST requires submerged fill pipe; fuel oil throughput NTE 21,000gal/yr; SOx NTE 0.8 #/MBTU heat input. Reg 3.4(c)(1)(B)(i)(b).
Original Permit Application Date:	/ /
Permit to Install Issue Date:	08/23/91
Installation Completed Date:	03/01/92
Original Permit to Operate Date:	01/29/92
Latest Date Permit Amended:	12/27/91
Latest Date Permit Reissued:	/ /
Effective Date of Latest Reissue:	/ /
Date for Permit Inspection/Testing:	/ /
Date Permit Expires:	/ /
Date Renewal Required:	/ /
Date Renewal Submitted:	/ /
Agency Contact Person:	JOHN GRANCHIE COE
Agency Contact Person - Telephone:	93930

UIS ID:	92008
ermit ID:	92-008
Permit to Install Number:	
Permit to Operate Number:	92-008-O
Registration number:	B.976
Application number:	
Status:	APPROVED TO OPERATE
Internal Administrative Data:	PAINT SPRAY BOOTH CONSISTING OF SOLVENT WIPE DOWN, EPOXY PRIMER, POLYURETHANE TOPCOAT UTILIZING MANUAL PRESSURE FEED.
Original Permit Application Date:	/ /
Permit to Install Issue Date:	/ /
Installation Completed Date:	/ /
Original Permit to Operate Date:	03/13/92
Latest Date Permit Amended:	/ /
Latest Date Permit Reissued:	/ /
Effective Date of Latest Reissue:	/ /
Date for Permit Inspection/Testing:	/ /
Date Permit Expires:	/ /
Date Renewal Required:	/ /
Date Renewal Submitted:	/ /
Agency Contact Person:	CPT RYDELL
Agency Contact Person - Telephone:	47124

AQUIS ID:	92009
Permit ID:	92-009
rmit to Install Number:	
Permit to Operate Number:	92-009-O
Registration number:	B.976
Application number:	
Status:	APPROVED TO OPERATE
Internal Administrative Data:	PAINT PREPARATION ROOM AND DRYING ROOM; SANDING OF AIRCRAFT PARTS AND AGE EQUIPMENT USING RANDOM ORBITAL SANDERS AND ALUMINUM OXIDE SANDING DISKS.
Original Permit Application Date:	03/06/92
Permit to Install Issue Date:	/ /
Installation Completed Date:	/ /
Original Permit to Operate Date:	04/07/92
Latest Date Permit Amended:	/ /
Latest Date Permit Reissued:	/ /
Effective Date of Latest Reissue:	/ /
Date for Permit Inspection/Testing:	/ /
Date Permit Expires:	/ /
Date Renewal Required:	/ /
Date Renewal Submitted:	/ /
Agency Contact Person:	CPT RYDELL
Agency Contact Person - Telephone:	47124

AQUIS ID:	92010
Permit ID:	92-010
Permit to Install Number:	
Permit to Operate Number:	92-010-O
Registration number:	B.230
Application number:	
Status:	APPROVED TO OPERATE
Internal Administrative Data:	PD-680 AND MEK CLEANING TANK FOR AIRCRAFT PARTS IN A 250 GAL. SOLVENT TANK.
Original Permit Application Date:	/ /
Permit to Install Issue Date:	/ /
Installation Completed Date:	/ /
Original Permit to Operate Date:	03/13/92
Latest Date Permit Amended:	/ /
Latest Date Permit Reissued:	/ /
Effective Date of Latest Reissue:	/ /
Date for Permit Inspection/Testing:	/ /
Date Permit Expires:	/ /
Date Renewal Required:	/ /
Date Renewal Submitted:	/ /
Agency Contact Person:	CPT RYDELL
Agency Contact Person - Telephone:	47124

APPENDIX D

TINKER AIR FORCE BASE SIGNIFICANT SPILLS, 1978-1981

Date	Location	Liquid Spills	Quantity Spilled	Comments
November 28, 1978	Facility 273	JP-4	1,200 gallons	Contained in dike and recovered
August 3, 1979	Building 3001	Acid scale conditioner	1,100 gallons	Neutralized
January 29, 1980	Building 486 (Hydrant System)	JP-4	1,500 gallons	No environmental damage
March 30, 1981	Building 486 (Hydrant System)	JP-4	2,500 gallons	No environmental damage

Source: Tinker AFB documents and employee interviews

APPROXIMATE DATE OF RELEASE: Mar 04, 1986, 8:00 a.m.

MATERIAL RELEASED: JP-4 Jet Fuel

AMOUNT RELEASED: 9500 gallons (estimated)

LOCATION OF RELEASE: Spill entered a tributary of Crutcho Creek located at the south end of the base just south of the AWACS Alert Facility.

RESPONSE ACTIONS: An electrical contractor hit an underground fuel line during digging operations. Fuel supply system was shut down until pipeline repairs could be made. Two low water earthen dams were constructed in the stream bed to contain the spill on base. An underflow baffle board was also placed in the stream to collect flowing fuel. Vacuum trucks were used to remove the fuel from the creek.

9A

C1 03 061400Z MAR 86 PP PP UUUU my copy EM 061200Z

YES

OC-ALC TINKER AFB//EM//

HQ AFLC WRIGHT PATTERSON AFB OH//DEPV//

INFO HQ USAF WASH DC//LEEV//SGES//

HQ AFESC TYNDALL AFB FL//DEVP//PA//DEMM//

HQ AFMSC BROOKS AFB TX//SGP//

USAF OEHL BROOKS AFB TX//ECW//

HQ USAF WASH DC//LEYS//

UNCLAS

SUBJ: INITIAL POLLUTION INCIDENT REPORT

1. NAME OF INSTALLATION: TINKER AFB, OKLAHOMA

2. INCIDENT REPORT NUMBER: INITIAL REPORT

3. DATE/TIME OF INCIDENT: 0800 HOURS, 4 MAR 1986

4. SEVERITY OF INCIDENT: MINOR

5. LOCATION AND TERRAIN: SPILL ENTERED A TRIBUTORY OF CRUTCHO CREEK LOCATED AT THE SOUTH END OF THE BASE JUST NORTH OF THE AWACS ALERT FACILITY. TERRAIN IS GENTLY ROLLING. SOIL IS CLAYEY LOAM. ABOUT 1/2 TO 3/4 MILE OF CREEK WAS AFFECTED.

6. CAUSE OF INCIDENT: ELECTRICAL CONTRACTOR HIT AN UNDERGROUND FUEL LINE DURING DIGGING OPERATIONS.

7. TYPE AND ESTIMATED AMOUNT OF POLLUTANT: ABOUT 9500 GALLONS OF

JIM LONG, EME, 43085

RAY D. REAVES, COL, EM, 44111

02 03 061400Z MAR 86 PP PP UUUU EM 061200Z

YES

JP-4 WAS SPILLED.

8. DAMAGE IMPACT ON SURROUNDINGS: NO DAMAGE TO FISH AND WILDLIFE WAS NOTED.

9. CORRECTIVE ACTION TO ELIMINATE POLLUTION SOURCE: FUEL SUPPLY SYSTEM WAS SHUT DOWN UNTIL PIPELINE REPAIRS COULD BE MADE.

10. CORRECTIVE ACTION TAKEN TO REMOVE POLLUTANT: TWO LOW WATER EARTHEN DAMS WERE CONSTRUCTED IN THE STREAM BED TO CONTAIN THE SPILL ON BASE. AN UNDERFLOW BAFFLE BOARD WAS ALSO PLACED IN THE STREAM TO COLLECT FLOATING FUEL. VACUUM TRUCKS WERE USED TO REMOVE THE FUEL FROM THE CREEK.

11. ASSISTANCE REQUIRED: NONE

12. ESTIMATED COMPLETION DATE OF REMEDIAL ACTIONS: PIPELINE REPAIRS SHOULD BE COMPLETE BY 6 MAR 1986. REMOVAL OF FUEL FROM CREEK IS COMPLETE.

13. ANTICIPATED OR ACTUAL REACTION BY THE NEWS MEDIA AND PUBLIC TO THE INCIDENT: NONE

14. POTENTIAL FOR LIABILITY: LOW

15. NOTIFICATIONS: THE NRC, OKLAHOMA WATER RESOURCES BOARD AND OKLAHOMA DEPARTMENT OF POLLUTION CONTROL WERE NOTIFIED WITHIN 24 HOURS OF THE INCIDENT.

JIM LONG, EME, 43085

RAY D. REAVES, COL, EM, 44111

YES

15. SPILL PREVENTION AND RESPONSE PLAN IMPLEMENTATION: FOLLOWING THE INITIAL NOTIFICATON, THE BASE CIVIL ENGINEER, AS ON SCENE COORDINATOR, ASSEMBLED THE SPILL RESPONSE TEAM AT THE SPILL SITE. CIVIL ENGINEERING IMMEDIATELY BEGAN CONSTRUCTION OF THE LOW WATER DAMS TO CONTAIN THE SPILL WHILE THE FIRE DEPARTMENT TOOK STEPS TO MINIMIZE IGNITION OF THE FUEL. VACUUM TRUCKS BEGAN REMOVING THE FUEL FROM THE CREEK WITHIN ONE OR TWO HOURS OF THE INITIAL NOTIFICATION. THE ENVIRONMENTAL MANAGEMENT OFFICE MADE THE NOTIFICATIONS TO HQ AFLC AND THE AGENCIES IN ITEM 4.

JIM LONG, EME, 43085

RAY D. REAVES, COL, EM, 44111

APPROXIMATE DATE OF RELEASE: Feb 22, 1990, 1:00 p.m.

MATERIAL RELEASED: JP-4 Jet Fuel

AMOUNT RELEASED: 800 gallcns (estimated)

LOCATION OF RELEASE: The pressure relief valve on fuel tank # 995 stuck open.

RESPONSE ACTIONS: Booms were used to contain the spilled fuel in creek near Bldg 1030. The base waste transportation contractor responded and pumped the fuel from the creek. Fuel was then sent to a recycling facility.

SPILL_DATE: 02/22/90
AMOUNT: 100
UNIT: G
CHEMICAL: JP-4
LOCATION: FUEL TANKS NORTH OF AWACS ALERT FACILITY
CAUSE: A MALFUNCTIONING VALVE IN A FUEL TRANSFER LINE ALLOWED THE FUEL TO

NRC_REP_NO:
COMMENTS: REPORTED TO NRC BY KAREN DAY. RQ EXCEEDED FOR D001 (1000#). PRES
NKS TO PREVENT THIS FROM OCCURRING IN THE FUTURE.
XCOORD: 9306048
YCOORD: 8613312

FIRE PROTECTION BRANCH
Investigators Field Report

EVENT No: 004115	DATE: 02/21/1990	TYPE INCNO: CHEMICAL
Spill Cls: 2	Amt: 800 gals	C/F JP4
FACIL No: 995		Acft/Veh
Sit Rept: CHEM SPILL, UNCLASS		Equip Resp CH2
Dispatched: 13:00	On Scene 13:05	Time In Svc 15:15 2,25
Fire Investigator: AJB		SR-OFFICER: YANDELL
First Unit Crew Chief: YANDELL		ACTION TAKEN OTHER
Assignment Response Time	5 Minutes	EST $ LST: 0
Pers Resp: RANDY, GILREATH		Resp Organ: OSSG
Phone: 94222		
VEH-ID:	LOCAL #:	Veh Lic No:

DAMAGE ASSESSMENT

CAUSE

MECHANICAL FAILURE - PRESSURE RELIEF VALVE STUCK OPEN.

INVESTIGATOR'S SUMMARY

TALKED TO EARL [illegible] AND HE BELIEVES THAT A PRESSURE RELIEF VALVE STUCK OPEN AND CAUSED THE SPILL. THE RELIEF VALVES ARE GOING TO BE REPIPED BACK TO THE SUPPLY TANK AND NOT INTO THE SLOP TANK. THE HOLDING TANK WEST OF BLG. 1030 WAS CLOSED AND USPCI SKIMMED THE TOP OF THE WATER TO RECOVER THE FUEL. BOOMS WERE PUT IN THE CREEK WEST OF HOLDIN G POND TO SKIM OFF ANY FUEL THAT GOT PAST THE HOLDING POND. USPCI STATED THEY COULD RECOVER THE FUEL SO IT WAS TURNED OVER TO THEM FOR CLEAN UP.

PERSONS INTERVEIWED | By Phone
RANDY GILREATH | 94222

2-5
3-6
2-7
1-9
1-10
1-12
1-E3 23.7
1-E5 33.5
57.2

2xGS7 x 3.25 hrs on Spill 13.75
1xGS7 x 4 hrs follow up 70.00

Ch 2 Yandell
5 1 Stallcup
E 3 Ray
Carico
H 1 Lang
R 3 Shipman
Shipman
Randell
Ch 1 Martin
E 1 Shepherd
Jackson
Moore E

GOZA
Goodbird Rowland
Duane

2 / ? / 800 gal / FD 4,186.83 / $375 / CP ?

D-8

APPROXIMATE DATE OF RELEASE: Mar 27, 1990, 9:30 a.m.

MATERIAL RELEASED: Dilute industrial rinsewaters containing chromiums and phenols

AMOUNT RELEASED: 1700 gallons (estimated)

LOCATION OF RELEASE: Rinsewater overflowed the lift station east of the blade repair facility, Bldg 3221.

RESPONSE ACTIONS: The lift station pumps had been manually shut off prior to the release. Sand was used to block street storm drains. The base waste transportation contractor pumped approximately 1500 gallons from the street. Soldier Creek was boomed and pumped until levels of pollutants in the stream met Clean Water Standards.

file 36 mg

01 02 031500Z APR 90 RR UUUU EMX1000

HQ AFLC WRIGHT PATTERSON AFB OH/DEV/JAM//
HQ USAF WASH DC/LEEV/SGES//
HQ AFESC TYNALL AFB FL/DEVP/PA/DEMM//
HQ AFMSC BROOKS AFB TX/SGP//
USAF OEHL BROOKS AFB TX/ECW//
2854 ABG TINKER AFB/CC//

UNCLAS

SUBJECT: SPILL RESPONSE

1. NAME OF INSTALLATION: TINKER AFB, OK

2. INCIDENT REPORT NUMBER: INITIAL/FINAL REPORT

3. DATE/TIME OF INCIDENT: 27 MAR 90/0930 HRS

4. SEVERITY OF INCIDENT: NO DAMAGE TO FISH OR WILDLIFE; APPROXIMATELY 90 PERCENT OF MATERIAL WAS REMOVED FROM THE AREA AND REMEDIAL CLEAN UP WAS COMPLETED ON 27 MAR 90.

5. LOCATION OF INCIDENT AND NATURE OF TERRAIN: DILUTE RINSE WATER OVERFLOWED THE LIFT STATION EAST OF THE BLADE REPAIR FACILITY AT BLDG 3221.

6. CAUSE OF INCIDENT: THE LIFT STATION PUMPS HAD BEEN MANUALLY SHUT OFF.

7. TYPE AND AMOUNT OF POLLUTANT: APPROXIMATELY 1700 GALLONS OF DILUTE RINSE WATER CONTAINING CHROMIUMS AND PHENOLS OVERFLOWED THE LIFT STATION.

KAREN DAY, GS-07
EMX/44100

PATTI FORD, CHIEF, EMX, 44100

Patti Ford

8. DAMAGE IMPACT ON SURROUNDINGS: NONE.

9. CORRECTIVE ACTION TO ELIMINATE SOURCE: ALL ACTIONS TO SECURE THE OVERFLOW WERE COMPLETED ON 27 MAR 90.

10. CORRECTIVE ACTION TO REMOVE POLLUTANT: USPCI REMOVED 90 PERCENT OF SPILL FROM STREET. THE REMAINDER OF THE SPILLED MATERIAL WAS CONTAINED BY BOOMS AND VACUUMED FROM THE CREEK. FINAL CLEAN UP WAS ACCOMPLISHED ON 27 MAR 90.

11. ASSISTANCE REQUIRED: TINKER AFB FIRE DEPARTMENT, USPCI, AND EMC REPRESENTATIVES WERE ON SCENE.

12. ESTIMATED CLEAN UP DATE OF REMEDIAL ACTION: COMPLETED 27 MAR 90.

13. ANTICIPATED NEWS REACTION: NONE.

14. NOTIFICATIONS: NRC, MR. CHERRY, INCIDENT REPORT NUMBER 14539; OKLAHOMA WATER RESOURCES BOARD, NANCY CAIN.

15. SPILL PLAN IMPLEMENTATION: DAN LUTON, AUTOVON 884-2010

KAREN DAY, GS-07 KLD
EMX/44100

PATTI FORD, CHIEF, EMX, 44100

SPILL_DATE: 03/27/90
AMOUNT: 1750
UNIT: G
CHEMICAL: INDUSTRIAL WASTE
LOCATION: SOLDIER CREEK, FROM B/3221 BLADE REPAIR FACILITY
CAUSE: BREAKER WAS THROWN, CAUSING LIFT STATION PUMPS TO KICK OFF. THIS AL
NRC_REP_NO: 14539
COMMENTS: REPORTED BY KAREN DAY. LOW CONCENTRATIONS OF PHENOL AND CHROMIUM WE
ET.
XCOORD: 11950208
YCOORD: 14722560

FIRE PROTECTION BRANCH
Investigators Field Report

EVENT No: 004440 : DATE: 03/27/1990	TYPE INCND CHEMICAL
Spill Cls: 3 : Amt: 1,700 gals	C/F RINSE WATER CHEMICAL
FACIL No: 3221	Acft/Veh
Sit Rept: CHEM SPILL, FACILITY	Equip Resp CH2
Dispatched: 08:39 : On Scene 08:39	Time In Svc 09:24 2.45 1.75
Fire Investigator: AJS	SR-OFFICER: INGRAM
First Unit Crew Chief: INGRAM	ACTION TAKEN STANDBY
Assignment Response Time 0 Minutes	EST COST: 0
Pers Resp: KIT, LEWIS	Resp Organ: MAEES
Phone: 62289 :	
VEH-ID: : DECAL:	Veh Lic No:

DAMAGE ASSESSMENT

CAUSE

MECHANICAL FAILURE- BREAKER TRIPPED

INVESTIGATOR'S SUMMARY

WHEN THE FIRE DEPT. ARRIVED THE SUMP PUMP HAD BLOWN THE BREAKER AND RINSE WATER WAS OVER FLOWING OUT OF THE SUMP TANK. THE FIRE DEPT. PUT SAND DOWN TO COVER DRAINS AND CONTAIN THE SPILL. USPCI RECOVERED APPROXIMATELY 1500 GAL. AND IT WAS ESTIMATED THE TOTAL SPILL WAS 1700 GAL.

PERSONS INTERVEIWED — By Phone
KIT LEWIS — 62289

2 X G57 X 1.75 hrs

5-5
2-4
1-7
1-9
1-10

Ch 2 Clanton Hodges
S1 Ray Stallcup Marlin
E3 Rucker Jackson Mays
R3 Ingram
H1 AJ

2 / 2 / 1700 gal / 727.28 / 61.25 / 1301.60 / 7 /

Page Number: 1

D-13

APPROXIMATE DATE OF RELEASE: Jun 13, 1990

MATERIAL RELEASED: Zyglo Fluorescent Penetrant

AMOUNT RELEASED: 20 gallons (estimated)

LOCATION OF RELEASE: The penetrant was inadvertently released to a storm drain within Bldg 214. The storm drain terminated at Kuhlman creek west of Bldg 214.

RESPONSE ACTIONS: A leak in a zyglo fluorescent penetrant tank in Bldg 214 allowed an estimated 20 gallons of penetrant to leak into a storm drain located within the building. Fire Department personnel used sandbags to contain the release in the creek. The base waste transportation contractor pumped the spill residue until the oil sheen was removed and the water met clean water standards for turbidity.

Bob

subject: Zyglo Penetrant spill, 13 June 90 08:30 am

Approximately 20 gallons of Zyglo penetrant was released into Kuhlman creek, west of B/280, due to a hose break on a process tank in B/214. The spill material was contained in the creek and is being removed by vacuum truck and transported to the Industrial Waste Treatment Plant (IWTP) for disposal. All material was contained on base and we anticipate cleanup to be complete on 13 June in the afternoon.

Zyglo is non-hazardous but does contain small quantities of petroleum distillates, which created a visible oil sheen (RQ for oil). The material is bright green due to dyes and therefore will be removed because it exceeds the color standards for stream water.

No adverse effects were observed to wildlife, etc.

s ge 4.

TED : 13 Jun 1990 at 1442 CDT
BJECT : Zyglo Spill, 13 Jun 90
NT BY : pford (GS-12 Patti Ford;EMX;)
NT TO : breed
PY TO : alawrenc
ATUS : old, read, receipt sent

b,
reported subject spill to the National Response Center (Brantley, report
mber 26713) and the OWRB (Nancy Cain) at 2:15.
tti

FIRE PROTECTION BRANCH
Investigators Field Report

EVENT No: 005190	DATE: 05/13/1990	TYPE INCND CHEMICAL
Spill Cls: 3	Amt: 40 gals	C/F ZYGLO
FACIL No: 280		Acft/Veh
Sit Rept: CHEM SPILL, FACILITY		Equip Resp CH2
Dispatched: 07:41	On Scene 07:44	Time In Svc 08:34
Fire Investigator: AJS		SR-OFFICER: YANDELL
First Unit Crew Chief: SMITH		ACTION TAKEN STANDBY
Assignment Response Time 3 Minutes		EST COST: 0
Pers Resp: RALPH, MENGERS		Resp Organ: MATPAE
Phone: 64111		
FH-ID:	DECAL#:	Veh Lic No:

DAMAGE ASSESSMENT

CAUSE

HUMAN ERROR- MISCOMMUNICATIONS ON WHETHER THE FLOOR DRAIN WAS TIED INTO THE INDUSTERIAL LINE OR STORM DRAIN.

INVESTIGATOR'S SUMMARY

THERE WAS A CHEMICAL LEAK ON A ZYGLO (FLORESCENT PENETRANT) TANK EARLIER IN THE MORNING AT BUILDING 214. APPROXIMATELY 40 GAL. LEAKED INTO A FLOOR DRAIN. THE SUPERVISOR OF THE AREA THOUGHT THE DRAIN WAS TIED INTO THE INDUSTERIAL WASTE LINE,BUT IT WAS TIED INTO THE STORM DRAIN LINE. THE SPILL ENDED UP IN KUHLMAN CREEK. THE FIRE DEPT. SAND BAGGED THE CREEK TO STIP THE FLOW UNTIL ROADS AND GROUNDS COULD BUILD A DAM ACROSS THE CREEK. USPCI WAS CALLED TO PUMP OUT THE CREEK. THE SPILL WAS TURN OVER TO DEM, USPCI AND EM TO COMPLETE RECOVERY OF THE CHEMICAL. ALSO SEE RUN # 5138.

PERSONS INTERVEIWED		Dy Phone
STEVE POTES	MAIV	65871
JERI HART	EMC	42010
GEORGE MCWAD	EMC	42010
JIM BONE	DEM	43326

2X657 X 8 hrs
1X695 72. X 8 hrs U210
1-7
3-4
7-5
Ch 2 Yandell
R 1 Lang 2-?
S 1 Hodges
E 1 3-5
H 1 Wentka Walston

2 / ~ / 866.24 / U210 /

Page Number: 9

FIRE PROTECTION BRANCH
Investigators Field Report

EVENT No: 005198 : DATE: 06/13/1990	TYPE INCND CHEMICAL
Spill Cls: 2 : Amt: 10 gals	C/F ZYGLO
FACIL No: 214	Acft/Veh
Sit Rept: CHEM SPILL, FACILITY	Equip Resp CH2
Dispatched: 06:20 : On Scene 06:22	Time In Svc 06:49 ,5
Fire Investigator: BRUSH	SR-OFFICER: HENSLEY
First Unit Crew Chief: HENSLEY	ACTION TAKEN CALLED CE W/O
Assignment Response Time 2 Minutes	EST COST: 10
Pers Resp: NONE, NONE	Resp Organ: NONE
Phone: 00000000 :	
H-ID: : DECAL#:	Veh Lic No:

DAMAGE ASSESSMENT

RUBBER HOSE
102

CAUSE

PUMP TO ZYGLO MACHINE LEFT ON OVER NIGHT UNDER PRESSURE,RUPT
URING HOSE

INVESTIGATOR'S SUMMARY

PUMP TO ZYGLO MACHINE WAS LEFT ON OVER NIGHT RUPTURING HOSE. APPROX.10 GALLONS OF ZYGLO SPILLED ON THE FLOOR .THE HOSE WA S UNDER PRESSURE.FIRE DEPT. PERSONNEL PLACED VISQUEEN OVER DRAIN TO PREVENT LIQUID FROM ENTERING INDUSTRIAL DRAIN.PRIOR TO COVERING DRAIN,A SMALL AMOUNT OF LIQUID DID ENTER DRAIN.

PERSONS INTERVIEWED — Dy Phone
RALPH MENGERS MATP — 64111 1-7
ROBERT HUDGINS MAT — 64111 2-4

7-5

Ch 2 Yoder
E1 Hodges
S1
H1

2 / 2 / 632.74 / Page Number: 7

D-18

B make copy For Trudi

Spill Report Form
(Use back of form if necessary)

EM Contact: L. Lawrence Report Date 13 June 90

1. Incident control number:

2. Date/time of incident: overnight; found ~ 615am 13 June 90

3. Severity of incident:

4. Location (include description of water bodies impacted):
B214, S bay — possible drain to plunge basin

5. Cause: hose busted on Dipenetrant tank - SL3 & 84
6850-01-121-3007

6. Type and estimated amount of pollutant: 40-45 gals
How estimated? 16' X 10' Area
Samples collected? No If "yes", attach results.

7. Damage to surroundings, including fish and wildlife:

8. Corrective action to eliminate pollution source:
Crew mopping up area

9. Corrective action taken to remove pollutant: Crew mopped up area & will drum up waste & dispose thru DRMO

10. Assistance required:

11. Estimated completion date of remedial actions:

12. Anticipated or actual reaction by news media and potential for liability: None

13. NRC, EPA, state and Air Force notifications made: N/A

14. How was Spill Prevention and Response Plan implemented? (Include response organizations) FD, B10, EM

15. Is Environmental Deficiency Record (EDR) needed?
If "yes", list assigned EDR number:

16. Remarks: Ralph Mengers on scene loaned from B210

APPROXIMATE DATE OF RELEASE: Jul 26, 1990

MATERIAL RELEASED: JP-4 Jet Fuel

AMOUNT RELEASED: 1850 gallons (estimated)

LOCATION OF RELEASE: The release occurred at the fuel tank farm to the north of the AWAC Alert Facility.

RESPONSE ACTIONS: A contractor, working on a project to replace the fuel lines in the area, inadvertently dropped a rock from a backhoe, onto an exposed underground fiberglass fuel line. Fuel was contained in the pit being dug to replace the line. The base waste transportation contractor responded and pumped the fuel from the pit. Contaminated soil was removed and disposed of as hazardous waste.

01 02 011000Z AUG 90 RR UUUU EMX1000

OC-ALC TINKER AFB OK/EMX//

HQ AFLC WRIGHT PATTERSON AFB OH/DEV/JAM//

INFO HQ USAF WASH DC/LEEV/SGES//

HQ AFESC TYNDALL AFB FL/DEVP/PA/DEMM//

HQ AFMSC BROOKS AFB TX/SGP//

USAF OEHL BROOKS AFB TX/ECW//

HQ USAF WASH DC/LEYS//

2854 ABG TINKER AFB/CC//

UNCLAS

SUBJECT: SPILL RESPONSE, 26 JUL 90

1. NAME OF INSTALLATION: TINKER AFB, OK

2. INCIDENT REPORT NUMBER: 32927, BRANTLEY

3. DATE/TIME OF INCIDENT: 26 JUL 90, APPROXIMATELY 1145

4. SEVERITY OF INCIDENT: NO POTENTIAL THREAT TO PROPERTY, HUMAN, ANIMAL OR PLANT LIFE.

5. LOCATION OF INCIDENT AND NATURE OF TERRAIN: ALERT FACILITY RAMP -- LEGAL DESCRIPTION: SECTION 23 SW, TOWNSHIP 11 N, RANGE 2 W

6. CAUSE OF INCIDENT: A CONTRACTOR REPLACING THE HYDRANT SYSTEM FUEL LINE TO THE ALERT FACILITY RAMP SAID A ROCK FELL FROM THE TRENCH HITTING THE SOFT

KAREN DAY, GS-07
EMX/44100

KLD

PATTI FORD, CHIEF, EMX, 44100

Patti Ford

02 02 RR UUUU EMX1000

12" FIBERGLASS LINE AND CAUSED A HOLE. THE SYSTEM WAS NOT UNDER PRESSURE AT THE TIME.

7. TYPE AND AMOUNT OF POLLUTANT: JP4 - ESTIMATED 1850 GALLONS.

8. DAMAGE IMPACT ON SURROUNDINGS: NONE.

9. CORRECTIVE ACTION TO ELIMINATE SOURCE: NO ACTION NECESSARY.

10. CORRECTIVE ACTION TO REMOVE POLLUTANT: ALL LIQUID FUEL WAS CONTAINED AND REMOVED FROM THE TRENCH BY USPCI AND TRANSPORTED TO HYDROCARBON RECYCLING PLANT IN TULSA, OK. THE CONTAMINATED SOIL WILL BE DISPOSED OF AS A HAZARDOUS WASTE THROUGH DRMO.

11. ASSISTANCE REQUIRED: TINKER AFB FIRE DEPARTMENT AND USPCI.

12. ESTIMATED CLEAN UP DATE OF REMEDIAL ACTION: COMPLETED 27 JUL 90.

13. ANTICIPATED NEWS REACTION: NO ANTICIPATED REACTIONS OR POTENTIAL LIABILITY.

14. NOTIFICATIONS: NATIONAL RESPONSE TEAM AND OKLAHOMA WATER RESOURCES BOARD WERE NOTIFIED.

15. SPILL PLAN IMPLEMENTATION: PLAN IMPLEMENTED BY CALL FROM THE CORP OF ENGINEERS TO THE FIRE DEPARTMENT.

KAREN DAY, GS-07
EMX/44100

KD

PATTI FORD, CHIEF, EMX, 44100

Patti Ford

FIRE PROTECTION BRANCH
Investigators Field Report

ENT No: 005528 : DATE: 07/26/1990	TYPE INCND FUEL
Spill Cls: 3 : Amt: 2,000 gals	C/F JP 4
FACIL No: 989	Acft/Veh
Sit Rept: FUEL SPILL, PIPELINE, CLS 3	Equip Resp
Dispatched: 11:35 : On Scene 11:38	Time In Svc 15:19
Fire Investigator: AJS	SR-OFFICER: HENSLEY
First Unit Crew Chief: HENSLEY	ACTION TAKEN OTHER
Assignment Response Time 3 Minutes	EST COST: 0
Pers Resp: ROBERT, DENNIS	Resp Organ: CONTRACTOR
Phone: 733-0245 :	
VEH-ID: : DECAL#:	Veh Lic No:

DAMAGE ASSESSMENT

FUEL LINE AND HAZMAT GEAR.

CAUSE

HUMAN ERROR-BACKHOE OPERATOR HIT FUEL LINE.

INVESTIGATOR'S SUMMARY

ROBERT W. DENNIS 441-42-9111 WITH W.P.C. CONSTRUCTION WAS USEING A BACKHOE WHEN HE PUNCTURED A 12" JP-4 FUEL LINE THAT WAS ABOUT 10' UNDERGROUND. THE FIRE DEPT. TRIED TO PUT A PATCH ON THE LINE, BUT THERE WAS MORE THAN ONE HOLE IN THE LINE. THE LEAKING FUEL WAS CONTAINED IN THE TRENCH SO USPCI WAS CALLED IN TO PUMP OUT APPROX. 2000GAL. WHILE LIQUID FUEL PERSONNEL DRAINED THE FUEL LINE THAT WENT TO THE AWAC RAMP.

PERSONS INTERVEIWED	Dy Phone
ROBERT DENNIS	733-0245
W.P.C.CONSTRUCTION	733-0245

1 x GS 2 x 2.5 hrs
2 x GS 7 x 1.5 hrs

2 / 4290.34 / 1303

FIRE PROTECTION BRANCH
Investigators Field Report

Generated August 1, 1990 at 7:16 AM

EVENT No: 005528	DATE: 07/26/1990	TYPE INCND FUEL
Spill Cls: 3	Amt: 2,000 gals	C/F JP 4
FACIL No: 989		Acft/Veh
Sit Rept: FUEL SPILL,PIPELINE,CLS 3		Equip Resp
Dispatched: 11:35	On Scene 11:38	Time In Svc 15:19
Fire Investigator: AJS		SR-OFFICER: HENSLEY
First Unit Crew Chief: HENSLEY		ACTION TAKEN OTHER
Assignment Response Time 3 Minutes		EST COST: 0
Pers Resp: ROBERT, DENNIS		Resp Organ: CONTRACTOR
Phone: 733-0245		
VEH-ID:	DECAL#:	Veh Lic No:

DAMAGE ASSESSMENT

FUEL LINE AND HAZMAT GEAR.

CAUSE

HUMAN ERROR-BACKHOE OPERATOR HIT FUEL LINE.

INVESTIGATOR'S SUMMARY

ROBERT W. DENNIS 441-42-9111 WITH W.P.C. CONSTRUCTION WAS USEING A BACKHOE WHEN HE PUNCTURED A 12" JP-4 FUEL LINE THAT WAS ABOUT 10' UNDERGROUND. THE FIRE DEPT. TRIED TO PUT A PATCH ON THE LINE, BUT THERE WAS MORE THAN ONE HOLE IN THE LINE. THE LEAKING FUEL WAS CONTAINED IN THE TRENCH SO USPCI WAS CALLED IN TO PUMP OUT APPROX. 2000GAL. WHILE LIQUID FUEL PERSONNEL DRAINED THE FUEL LINE THAT WENT TO THE AWAC RAMP.

PERSONS INTERVEIWED	Dy Phone
ROBERT DENNIS	733-0245
W.P.C.CONSTRUCTION	733-0245

Page Number: 1

Thedi

FUEL SPILL ON 26 JULY 90

Date of release: Thursday 26 July, at 11:45 AM

Amount of release: 1850 gallons of JP-4 (another 200 gallons of mixed AFFF (fire fighting foam) was taken to IWTP)

Cause of release: The contractor replacing the hydrant system fuel line to the alert facility ramp, said a rock fell from the trench hitting the soft 12" fiberglass line and caused a hole. The system was not under pressure at the time, but did drain approx. 1850 gallons of JP-4 by gravity flow into the pit before the hole was patched.

Cleanup: All liquid fuel was contained and removed from the trench area, and will be transported to a recycling facility. Removal of the liquids was completed by 1700 hrs on 26 July 90. Cleanup of contaminated soil from the trench will commence on 27 July 90, with an estimated completion time of 1400 hr 27 July 90. This contaminated soil will be disposed of as a hazardous waste (flammable solid).

Location of spill: North of AWACS alert facility. Legal location Range 2W-Township 11N Section 23 SOuthwest 1/4

WaterQuality: none released to creek system

APPROXIMATE DATE OF RELEASE: Aug 13, 1990, 4:00 p.m.

MATERIAL RELEASED: Anhydrous Ammonia, Compressed Gas.

AMOUNT RELEASED: 150 pounds

LOCATION OF RELEASE: Cylinder was located outside of the north end of Bldg 3001, west of Annex G.

RESPONSE ACTIONS: Personnel who work near the area noticed the ammonia gas odor and called the Tinker Fire Department. Upon arrival, Fire Department personnel discovered that the valve on the compressed gas cylinder was leaking. The contents of the cylinder had completely leaked out prior to the application of a leak kit.

file 36 mg

UNCLASSIFIED

01 02 201500Z AUG 90 RR UUUU EMX1000

OC ALC TINKER AFB OK/EMX//

HQ AFLC WRIGHT-PATTERSON OH/DEV/JAM//

INFO HQ USAF WASH DC/LEEV/SGES//

HQ AFESC TYNDALL AFB FL/DEVP/PA/DEMM//

HQ AFMSC BROOKS AFB TX/SGP//

USAF OEHL BROOKS AFB TX/ECW//

2854 ABG TINKER AFB/CC//

UNCLAS

SUBJECT: SPILL RESPONSE

1. NAME OF INSTALLATION: TINKER AFB, OK

2. INCIDENT REPORT NUMBER: INITIAL/FINAL REPORT

3. DATE/TIME OF INCIDENT: 13 AUG 90/1600 HRS

4. SEVERITY OF INCIDENT: NO DAMAGE TO FISH OR WILDLIFE.

5. LOCATION OF INCIDENT AND NATURE OF TERRAIN: AMMONIA GAS LEAKED OUT OF THE CYLINDER AT BLDG 3001 WEST OF ANNEX G.

6. CAUSE OF INCIDENT: THERE WAS A LEAKY VALVE ON THE CYLINDER.

7. TYPE AND AMOUNT OF POLLUTANT: APPROXIMATELY 150 LBS OF ANHYDROUS AMMONIA.

8. DAMAGE IMPACT ON SURROUNDINGS: NONE.

KAREN DAY, GS-07 KLD
EMX/44100

PATTI FORD, CHIEF, EMX, 44100

UNCLASSIFIED

02 02 RR UUUU EMX1000

9. CORRECTIVE ACTION TO ELIMINATE SOURCE: NO CLEANUP WAS INVOLVED AS THE CONTENTS DISPERSED AS A VAPOR.

10. CORRECTIVE ACTION TO REMOVE POLLUTANT: THE EMPTY CYLINDER WAS DISPOSED OF AS A HAZARDOUS WASTE.

11. ASSISTANCE REQUIRED: TINKER AFB FIRE DEPARTMENT AND EMC REPRESENTATIVES WERE ON SCENE.

12. ESTIMATED CLEAN UP DATE OF REMEDIAL ACTION: NO REMEDIAL CLEANUP.

13. ANTICIPATED NEWS REACTION: NONE.

14. NOTIFICATIONS: NRC, MARK BRANTLEY, INCIDENT REPORT NUMBER 35367; OKLAHOMA WATER RESOURCES BOARD, NANCY CAIN.

15. SPILL PLAN IMPLEMENTATION: DAN LUTON, AV 884-2010.

KAREN DAY, GS-07 KLD
EMX/44100

PATTI FORD, CHIEF, EMX, 44100
Patti Ford

SPILL_DATE: 08/14/90
AMOUNT: 150
UNIT: P
CHEMICAL: AMMONIA, GAS
LOCATION: B/3001 ANNEX G
CAUSE: THE CYLINDER OF AMMONIA, USED BY SC TO DEVELOP BLUE PRINTS, DEVELOPED A
DE AND THE FUMEQUICKLY DISSIPATED.
NRC_REP_NO: 35367
COMMENTS: REPORTED TO NRC BY KAREN DAY. SPILL OCCURRED AT 1540 PM.

XCOORD: 11438720
YCOORD: 17985760

file
36
ms

20 AUG 1990

Oklahoma Water Resources Board
1000 NE 10th Street
PO Box 53585
Oklahoma City, Ok 73152

Dear Sirs

This is to confirm our spill report that was called into your agency on 14 Aug 90.

A spill of ammonia gas occured on 13 Aug at approximately 1600 hours at building 3001 West Annex G. The entire contents of the 150 lb cylinder were released because of a leaky valve. The ammonia is in conjunction with a reproduction unit. There was no clean up involved as the cylinder contents dispersed as a vapor. No damage to fish or wildlife was observed.

The legal description of spill is R2W, T11N, NE 1/2 of Section 14. Point of contact for further information is Karen Day, OC-ALC/EMX, 734-4100.

PATTI FORD, Chief,
Environmental Planning Division

FIRE PROTECTION BRANCH
Investigators Field Report

EVENT No: 005663	DATE: 08/13/1990	TYPE INCND CHEMICAL
Spill Cls: 1	Amt: 1 gals	C/F AMMONIA
FACIL No: 3001		Acft/Veh
Sit Rept: CHEM SPILL, BLDG, CLASS 2		Equip Resp
Dispatched: 15:45	On Scene 15:52	Time In Svc 17:11 1.5
Fire Investigator: AJS		SR-OFFICER: HENSLEY
First Unit Crew Chief: HENSLEY		ACTION TAKEN
Assignment Response Time 7 Minutes		EST COST: 0
Pers Resp: SHERRI, WOOD		Resp Organ: MMODCT
Phone: 65638		
VEh-ID:	DECALS:	Veh Lic No:

DAMAGE ASSESSMENT

CAUSE

MECHANICAL FAILURE- A SMALL LEAK IN THE VALVE.

INVESTIGATOR'S SUMMARY

THE PERSONNEL DISCOVERED A LEAK EARLIER IN THE DAY AND HAD BIO TO COME AND TAKE AIR SAMPLES AND THEY FOUND A SMALL LEAK ON THE VALVE HEAD. BIO ADVISED TO LEAVE IT OUT SIDE AND HAVE IT REPAIRED. THEY CONTACTED THE COMPANY THAT PROVIDES THE AMMONIA AND THEY SAID THEY WOULDN'T TAKE CARE OF IT. ANOTHER WORKER IN THE AREA CALLED THE FIRE DEPT. ON THE LEAK. THE FIRE DEPT. TRIED TO USE THE CYLINDER KIT TO STOP THE LEAK BUT THE 100 LB. REPAIR KIT WOULDN'T FIT. SO WE CORDONED THE AREA OFF AND ALLOWED IT TO LEAK. BIO WENT IN TO AREA TO CHECK FOR LEAK LATER AND DIDN'T GET ANY READINGS OF AMMONIA. EM AND FIRE DEPT. WILL GET WILL MMODCT TO FOLLOW UP ON THE PROBLEM SO THE PERSONNEL WILL HAVE A PLAN OF ACTION IN THE FUTURE.

Ch 2
Eng 3
SQ 1
W 72
Hi 7]

1-11
2-4
7-5
1-9

PERSONS INTERVEIWED | Dy Phone
SHERRI WOOD | 65638
MARY LEE SPERMAN | 65638

1 X GS 7 (GR) x 2 hrs
1 X GS 12 (DC) x 2 hrs

35.00
62.10
97.10

02/02/16 57.29/97.10/

Page Number: 4

APPROXIMATE DATE OF RELEASE: Sep 11, 1990, 12:30 a.m.

MATERIAL RELEASED: JP-4 Jet Fuel

AMOUNT RELEASED: 500 gallons (estimated)

LOCATION OF RELEASE: Fuel bypassed an oil/water separator and migrated to the Kuhlman Plunge Basin north of Bldg 260.

RESPONSE ACTIONS: A faulty valve allowed the fuel to bypass an oil/water separator. The valve was repaired by base personnel. Creek booms and another oil/water separator were used to contain the released fuel in Kuhlman creek. Fuel and water were pumped from the creek. The fuel was transported to a fuel recycling facility for recovery.

01 02 171300Z SEP 90 RR UUUU EMX1000

OC/ALC/EMX// -

HQ AFLC WRIGHT-PATTERSON OH/DEV/JAM//

INFO HQ USAF WASH DC/LEEV/SGES//

HQ AFESC TYNDALL AFB FL/DEVP/PA/DEMM//

HQ AFMSC BROOKS AFB TX/SGP//

USAF OEHL BROOKS AFB TX/ECW//

HQ USAF WASH DC/LEY//

2854 ABG TINKER AFB/CC//

UNCLAS

SUBJECT: SPILL RESPONSE

1. NAME OF INSTALLATION: TINKER AFB, OK

2. INCIDENT REPORT NUMBER: INITIAL/FINAL REPORT

3. DATE/TIME OF INCIDENT: 11 SEP/0030 HRS

4. SEVERITY OF INCIDENT: NO DAMAGE TO FISH OR WILDLIFE. ALL MATERIAL WAS REMOVED FROM THE AREA AND REMEDIAL CLEAN UP WAS COMPLETED ON 11 SEP 90.

5. LOCATION OF INCIDENT AND NATURE OF TERRAIN: INCIDENT OCCURRED IN THE PLUNGE BASIN N OF BLDG 260, W OF BLDG 282.

6. CAUSE OF INCIDENT: FAULTY VALVE ALLOWED FUEL TO BYPASS AN OIL/WATER SEPARATOR.

KAREN DAY, GS-07
EMX/44100

PATTI FORD, CHIEF, EMX, 44100

7. TYPE AND AMOUNT OF POLLUTANT: APPROXIMATELY 500 GALLONS OF JP4.

8. DAMAGE IMPACT ON SURROUNDINGS: NONE.

9. CORRECTIVE ACTION TO ELIMINATE SOURCE: VALVE WAS REPAIRED ON 11 SEP 90.

10. CORRECTIVE ACTION TO REMOVE POLLUTANT: BOOMS AND AN OIL SEPARATOR WERE USED TO REMOVE THE SHEEN. THE WATER PORTION HAS BEEN TRANSFERRED TO THE IWTP AND THE FUEL TO A RECYCLING FACILITY IN TULSA.

11. ASSISTANCE REQUIRED: TINKER AFB FIRE DEPARTMENT AND EMC REPRESENTATIVES WERE ON SCENE.

12. ESTIMATED CLEAN UP DATE OF REMEDIAL ACTION: COMPLETED 11 SEP 90.

13. ANTICIPATED NEWS REACTION: NONE.

14. NOTIFICATIONS: NRC, MR. WILKER, INCIDENT REPORT NUMBER 39301; OKLAHOMA WATER RESOURCES BOARD, CHERYL BRADLEY.

15. SPILL PLAN IMPLEMENTATION: GERI HART, AV 884-2010.

KAREN DAY, GS-07
EMX/44100

PATTI FORD, CHIEF, EMX, 44100

SPILL_DATE: 09-11-90
AMOUNT: 500
UNIT: G
CHEMICAL: JP-4
LOCATION: KHULMAN CREEK, WEST OF BLG 280. ORIGINATED IN B/290 FUEL FARM AREA
CAUSE: LEAK FROM FAULTY VALVE, WHICH ALLOWED FUEL TO BYPASS OIL/WATER SEPE

NRC_REP_NO: 39301
COMMENTS: THE VALVE WAS REPLACED WITH A BLIND FLANGE TO ENSURE NO FURTHER SPI
D A JP-4 TRAILER INTO THE SYSTEM THE DAY PRIOR TO THE SPILL, WHICH RESULTED IN THE
XCOORD: 7532544
YCOORD: 18585600

EMX/DAY/45022/mg/18 Sep 90

file 036 mg

18 SEP 1990

Oklahoma Water Resources Board
1000 N E 10th Street
P O Box 53585
Oklahoma City, OK 73152

Dear Sirs

This is to confirm our spill that was called into your agency on 14 Sep 90.

Approximately 500 gallons of JP4 was released into Khulman Creek from the plunge basin N of building 260 at 0030 hrs, 11 Sep 90. The legal description is Section 15, Township 11N, Range 2W SW¼.

The spill was caused by a faculty valve which allowed fuel to bypass an oil/water separator. The valve was repaired on 11 Sep. Booms and an oil separator were used to remove the sheen, which was visible on the water surface. The water portion of the spill was transferred to the IWTP and the fuel was sent to HRI, a recycling facility in Tulsa. All material was contained on base and cleanup was completed on 11 Sep 90. No impact to fish or wildlife was observed.

Our point of contact for further information is Karen Day, 734-4100.

PATTI FORD, Chief
Environmental Planning Division
Directorate of Environmental Management

9/18
EMX/DAY

APPROXIMATE DATE OF RELEASE: Nov 4, 1991

MATERIAL RELEASED: JP-5 Jet Fuel

AMOUNT RELEASED: 30,000 gallons (estimated)

LOCATION OF RELEASE: Release was discovered in Soldier Creek and occurred along the stormwater collection system for that creek.

RESPONSE ACTIONS: Fire Department and Base Civil Engineering personnel responded and placed booms in the creek along the perimeter fence on the east side of the Industrial Wastewater Treatment Plant (IWTP). Fuel which collected in the IWTP oil/water separator was pumped and transported to a recycling facility for recovery. No fuel from this release was detected outside the boundaries of the Tinker facility.

JOINT MESSAGEFORM UNCLASSIFIED

01 02 061900Z NOV 91 RR RR UUUU EMCS1300

YES

FROM: OC-ALC TINKER AFB OK /EMCS//

TO: HQ AFLC WRIGHT-PATTERSON OH/CEV/JAM//

INFO HQ USAF WASH DC/LEEV/SGEES//

HQ AFESC TYNDALL AFB FL/DEVP/PA/DEMM//

HQ AFMSC BROOKS AFB TX/SGP//

USAF OEHL BROOKS AFB TX/ECW//

2854 ABG TINKER AFB/CC//

UNCLAS

SUBJECT: SPILL RESPONSE

1. NAME OF INSTALLATION: TINKER AFB, OK

2. INCIDENT REPORT NUMBER: INITIAL/FINAL REPORT

3. DATE/TIME OF INCIDENT: 04 NOV 91/0100 HRS

4. SEVERITY OF INCIDENT: MAJOR RELEASE

5. LOCATION OF INCIDENT AND NATURE OF TERRAIN: JP-5 LEAKED OUT OF ABOVE GROUND STORAGE TANK NUMBER 3716, SOUTHEAST OF BLDG 3703. FUEL HAS BEEN CONTAINED IN OIL WATER SEPARATOR AT THE IWTP. NO RELEASE BEYOND BASE BOUNDARIES.

6. CAUSE OF INCIDENT: UNDER INVESTIGATION

7. TYPE AND AMOUNT OF POLLUTANT: UP TO 30,000 GALLONS OF JP-5

JUDY RAMSEY, GS-09

EMCS/47071

PATTI L. FORD, CHIEF, EMCS, 43022

UNCLASSIFIED 061900Z

JOINT MESSAGEFORM

02 02 061900Z NOV 91 RR RR UUUU EMCS1300

FROM:

TO:

9. CORRECTIVE ACTION TO ELIMINATE SOURCE: TANK LINES HAVE BEEN ISOLATED. PRESSURE CHECKS ARE CURRENTLY BEING CONDUCTED.

10. CORRECTIVE ACTION TO REMOVE POLLUTANT: PUMPING FUEL FROM ON BASE OIL WATER SEPARATOR AND SOLDIER CREEK. CREEK HAS BEEN BOOMED TO PREVENT THE MIGRATION OF AN OIL SHEEN. CURRENTLY MANIFESTING FUEL OFF BASE FOR RECYCLING.

11. ASSISTANCE REQUIRED: TINKER AFB FIRE DEPARTMENT, EMCS, DSSG PERSONNEL ON SCENE.

12. ESTIMATED CLEANUP DATE OF REMEDIAL ACTION: 08 NOV 91

13. ANTICIPATED NEWS REACTION: NONE

14. NOTIFICATIONS: NRC, THOMAS WIKER. STATE EMERGENCY RESPONSE COMMISSION, LOCAL EMERGENCY PLANNING COMMITTEE, OKLAHOMA WATER RESOURCES BOARD.

15. SPILL PLAN IMPLEMENTATION: LAWANDA LAWRENCE, DSN884-7071

JUDY RAMSEY, GS-09
EMCS/47071

PATTI L. FORD, CHIEF, EMCS, 43022

UNCLASSIFIED 061900Z

EMCS/Ramsey/47071/na/14 Nov 91

14 NOV 1991

Oklahoma Dept of Pollution Control
Attn: Lynn Moss
P O Box 53504
OKC, OK 73152

Dear Ms Moss

Please find the attached Spill Report and MSDS for the fuel spill which occurred at Tinker AFB on 4 Nov 91. Your office will be updated as information becomes available.

Our point of contact is Ms Judy Ramsey at 405-734-7071.

Sincerely

ROBERT L. REED Chief
Environmental Compliance Division
Directorate of Environmental Management

2 Atch
1. Spill Report
2. JP-5 MSDS

EM

FIRE PROTECTION BRANCH
Investigators Field Report

Generated December 1, 1991 at 7:39 AM

ENT No: 009727	DATE: 11/04/1991	TYPE INCND CHEMICAL
Spill Cls:	Amt: 100 gals	C/F MAGAS
FACIL No: 2108		Acft/Veh
Sit Rept: CHEM SPILL, PIPELINE,CLS3		Equip Resp
Dispatched: 00:25	On Scene 00:29	Time In Svc 03:51
Fire Investigator: SKAGGS		SR-OFFICER: GIRILLO
First Unit Crew Chief: GIRILLO		ACTION TAKEN OTHER
Assignment Response Time 4 Minutes		EST COST: 0
Pers Resp:,		Resp Organ: DS
Phone:		
VEH-ID:	DECAL#:	Veh Lic No:

DAMAGE ASSESSMENT

PENDING FURTHER INVESTIGATION

CAUSE

WATER IN THE LINE DUE TO INCLIMATE WHEATHER CAUSED CAP TO BREAK WHICH LET MOGAS FLOW INTO DIKE. (TANK 2108)
THE PRODUCT IN THE CREEK EAST OF THE WATER AND WASTE PLANT MAY HAVE ORIGINATED AROUND BLDG. 3714. HOWEVER IT IS STILL UNDETERMINED.

INVESTIGATOR'S SUMMARY

WATER IN THE LINE DUE TO INCLIMATE WHEATHER CAUSED FILLER CAP TO BREAK WHICH LET MOGAS FLOW INTO THE DIKE. THE DIKE VALVE WAS OPEN CAUSING APPROXIMATELY 100 GALLONS OF MOGAS TO FLOW INTO THE DITCH. A UNDETERMINED AMOUNT WENT INTO THE STORM DRAIN.
THE CREEK BEHIND BLDG 935 WAS BOOMED AND NO PRODUCT WAS FOUND IN THIS AREA.
THE PRODUCT IN THE DITCH WAS SANDED AND THE STORM DRAIN WAS COVERED AND SAND BAGGED.
THE PRODUCT IN THE HOLD POND AT WATER AND WASTE IS BEING PUMPED OFF BY USPCI AND IS STILL UNDER INVESTIGATION.

PERSONS INTERVEIWED Dy Phone

Page Number: 1

2XGS9 X 2 hrs = 84.96

01-05

EM

FIRE PROTECTION BRANCH
Investigators Field Report

EVENT No: 009753	DATE: 11/05/1991	TYPE INCND FUEL
Spill Cls: 3	Amt: 36,000 gals	C/F JP5
FACIL No: 3714		Acft/Veh
Sit Rept: FUEL SPILL, PIPELINE, CLS 3		Equip Resp
Dispatched: 00:25	On Scene 00:28	Time In Svc 08:17
Fire Investigator: SKAGGS		SR-OFFICER: GIRILLO
First Unit Crew Chief: GIRILLO		ACTION TAKEN OTHER
Assignment Response Time 3 Minutes		EST COST: 0
Pers Resp:,		Resp Organ:
Phone:		
VEH-ID:	DECAL#:	Veh Lic No:

DAMAGE ASSESSMENT

UNKNOWN

CAUSE

PENDING ONGOING INVESTIGATION

INVESTIGATOR'S SUMMARY

PENDING FURTHER INVESTIGATION

PERSONS INTERVEIWED

Dy Phone

1 X G559 X 32 hrs 679.68
2 X G559 X 24 hrs 1359.36
~~3 X G559 X 32 hrs~~
2039.0

Page Number: 2

627-2054

TANK 2117

TINKER AIR FORCE BASE DIRECTORATE OF ENVIRONMENTAL MANAGEMENT

SPILL REPORT FORM

(Complete all blanks, use reverse side of form if necessary)

EM Contact: L Lawrence Report date: 11-4-91

Incident control #: ______ Date: 911104 Time: ~~08~~ 0100

Severity: ______ Responding agencies: SP, FD, EM, Water & Waste

Location (include water bodies impacted): 2108 - Tank (AG - 8,000g capacity) frozen valve - leaked to SS lines & contain at IWTP holding pond

Cause: Human error ______ Equipment failure X Procedure ______

Pressure related ______ Other ______

Remarks: The tank ~~to~~ has been inactive for approx a year. Valve to dike was open

Pollutant: JP4 - Mogas Amount: 8,000g How estimated: size of tank

Reportable quantity under CERCLA? ______ (If yes, complete all items on page 2)

Samples collected? Yes Results: JP4

Damage to soil, fish, wildlife, government property? ______

Action taken to eliminate pollution source: Valve shut off - dike valve plugged

Agency conducting cleanup: FD, Roads & Grounds, USPCI

Assistance required during cleanup: ______

Estimated completion date of remedial action: 11-5 or 11-6

Long term remediation required? Yes

How was release reported to Fire Dept/Em? S Police noticed leak

Is EDR required? Yes Why? Valve to dike area left open

Tank 2108 - cap busted? oil at valve - deactivate [illegible]

/ ? / / / / /

As required by the US EPA Accidental Release Information Program, the following information is required on all releases where a reportable quantity (RQ) of a hazardous material has been exceeded or any amount has left the perimeter of the Base whether by water or air. This information is also needed in order to prepare the narrative reports used to update Command weekly.

The list of RQ's is located in 40 CFR Part 300. If in doubt, call Judy Ramsey at 947-2903 or Mr. Dan Luton at Beeper #791-5067 and we will make the necessary notifications.

* NRC notified Wilkes, Thomas # 94914 Date: 4 Nov Time: 1210

* SERC notified ✓ Date: 4 Nov Time: 0745

**LEPC notified ✓ Date: 4 Nov Time: 0700

* EPA notified ________ Date: ________ Time: ________

* OWRB notified ✓ Date: 4 Nov Time: 0715

# of employees who work in the facility: 25000 # evacuated: 0

Date and time release began: 0030/4Nov91 Ended: 0030/4Nov91

Chemical name: Jet fuel CAS # ________ Concentration: 100%

Released to Air ________ Water X Land ________ IWTP ________

Was the general public notified? ________ How? ________

How was the release first discovered? in OW Separator

Injuries NO Hospitalized NO Fatalities ________

Facility costs incurred: pending

General public costs incurred: N/A

Was hazard evaluation performed at shop prior to the release? ongoing

Training, procedures, and management practices used by the shop to prevent a release of this type: Tank guaging of line tests

What changes in training, procedures, or management practices will be implemented at the shop as a result of the release? ________

Name of reporting official: ________ Org/RoutingSym: ________

Signature: ________ Date: ________

* To be completed in the event an RQ has been exceeded.

**To be completed when water bodies off-base are impacted.

APPROXIMATE DATE OF RELEASE: Mar 3, 1992, 8:00 p.m.

MATERIAL RELEASED: JP-4 Jet Fuel

AMOUNT RELEASED: 22,000 gallons (estimated)

LOCATION OF RELEASE: The release occurred when a fuel bypass line was inadvertently damaged by contractors installing a fence around the new Navy facility.

RESPONSE ACTIONS: All base response organizations responded and worked to locate and contain the release by using a series of booms on and off of the facility. Personnel from the Oklahoma Water Resources Board, the City County Health Department, Midwest City, Oklahoma City, Spencer and Nicoma Park all aided in containing the release. No more than 1000 gallons was believed to have left the installation boundaries. No fish kills occurred during or after the incident.

01 02 051844Z MAR 92 RR UUUU EM

OC ALC TINKER AFB OK//EMC//

HQ AFLC WRIGHT PATTERSON AFB OH//DEV/JAM//

INFO HQ USAF WASHINGTON DC//LEEV//

HQ AFESC TYNDALL AFB FL//DEVP/PA/DEMM//

HQ AFMSC BROOKS AFB TX//SGP//

USAF OEHL BROOKS AFB TX//ECW//

ZEN 2854ABG TINKER AFB OK//CC//

ACCT AF ACXJRF

UNCLAS

SUBJ: SPILL RESPONSE

1. NAME OF INSTALLATION: TINKER AFB, OK

2. INCIDENT REPORT NUMBER: INITIAL/FINAL REPORT

3. DATE/TIME OF INCIDENT: 03 MAR 92/2000 HRS

4. SEVERITY OF INCIDENT: MAJOR/NO DAMAGE TO FISH OR WILDLIFE

5. LOCATION OF INCIDENT AND NATURE OF TERRAIN: JP-4 LEAKED OUT OF DAMAGED SIX INCH UNDERGROUND TRANSFER LINE.

6. CAUSE OF INCIDENT: TRANSFER LINE WAS DAMAGED WHILE CONTRACTORS WERE INSTALLING A SECURITY FENCE.

7. TYPE AND AMOUNT OF POLLUTANT: 22000 GALLONS JP-4

8. DAMAGE IMPACT ON SURROUNDINGS: NONE DETECTED/LESS THAN 1000

JUDY RAMSEY
EMC, 43002

Robert L Reed
ROBERT L. REED, CHIEF EMC
C: 26693

)

GALLONS OF JP-4 WERE RELEASED TO CRUTCHO CREEK/NO LOSS OF FISH OR WILDLIFE WERE DETECTED

9. CORRECTIVE ACTION TO ELIMINATE SOURCE: DAMAGED LINE WAS PLUGGED/FUEL TRANSFER SYSTEM WAS TAKEN OUT OF SERVICE

10. CORRECTIVE ACTION TO REMOVE POLLUTANT: 50 - 60 ABSORBENT BOOMS PLACED IN CRUTCHO CREEK/SAND WAS SPREAD AT THE INCIDENT SITE TO ABSORB POOLED FUEL/ALL CONTAMINATED SOIL IS BEING REMOVED AND PLACED 10 MIL POLY TO BE SAMPLED AND AIR DRIED.

11. ASSISTANCE REQUIRED: TINKER AFB FIRE DEPARTMENT, MIDWEST CITY FIRE DEPARTMENT, SPENCER FIRE DEPARTMENT, OKLAHOMA CITY FIRE DEPARTMENT, ENVIRONMENTAL MANAGEMENT, BIOENVIRONMENTAL ENGINEERING, AND CIVIL ENGINEERING.

12. ESTIMATED CLEANUP DATE OF REMEDIAL ACTION: 19 MAR 92

13. ANTICIPATED NEWS REACTION: PRESS RESPONDED AND FILMED ALL OFF BASE OPERATIONS. PA COORDINATED ALL MEDIA ACTIVITIES ON THE INSTALLATION.

14. NOTIFICATIONS: NRC, OKLAHOMA DEPARTMENT OF POLLUTION CONTROL, LEPC, OKLAHOMA WATER RESOURCES BOARD

15. SPILL PLAN IMPLEMENTATION: FIRE DEPARTMENT, ENVIRONMENTAL MANAGEMENT

JUDY RAMSEY
EMC, 43002

Robert L Reed

ROBERT L. REED, CHIEF EMC
.C: 26693

FIRE PROTECTION BRANCH
Assistant Fire Chief's Daily Report (Perm)

Generated March 5, 1992 at 8:02 AM

Date: 03/04/1992 Event No.: 011496 Type Incid: FUEL Shft: BLUE

Facl: FD3 AC/Equip : VenId:

Tail# Tag#: Decal No:

Sit FUEL SPILL CREEK, CLASS 3 Chemical/Fuel: JP-4

Loc: VANDENBURG & MITCHELL

Notify By: [illegible] Group: [illegible] Phone: hotline

Equip EN31,SQ31,HIT1,CH2 ,RMP1,

Time of Call: 08:55:13.07 Time Out: 08:[illegible] Disp Time: 0 Min 19 Sec
Time On Scene 09:01 Response Time: 6 Min
Time In Svc: [illegible] Time In Scene: 21 hr [illegible] Min

Crew Chief GIRILLO [illegible]: [illegible]

Sit Found: [illegible] SPILL, RADIAT LEAK

Spill Cls: Spill Amt: [illegible] Injuries?: [illegible]: N

Action Taken: [illegible] [illegible] Activated: N

Type Agent: Agent Used: 0

[illegible]: [illegible] [illegible] Ph: [illegible]

Ground [illegible] Crew/Pass: 0

[illegible] Crew/Pass: [illegible]

[illegible]

UPON ARRIVAL AT VANDENBURG AND MITCHELL AVE, A SMELL OF FUEL WAS DETECTED. FIRE DEPT PERSONNEL WALKED THE CREEK NORTH AND SOUTH AND SAW SIGNS OF FUEL RESIDUE ALONG THE BANKS OF THE CREEK WHERE THE WATER HAD RECEDED. WITH THE ASSISTANCE FROM [illegible], THE LEL WAS MONITORED ALONG THE CREEK. BOOMS WERE SET UP AT THE DISCHARGE POINT LEAVING THE BASE FROM CRUTCHO CREEK AT THE GOLF COURSE AND TWO ADDITIONAL BOOMS PLACED BY THE [illegible] ALONG MITCHELL AVE. THE INITIAL COMMAND WAS SET UP AT WOLFE AND MITCHELL. IT WAS THAN MOVED TO BLDG 1023 AND THAN TO SAM'S WAREHOUSE PARKING LOT OFF OF 29TH STREET. CHIEF 201 RESPONDED TO THE MIDWEST CITY FD COMMAND POST AND ESTABLISHED THE TINKER MCP WHILE CHIEF 2 TOOK COMMAND OF THE TINKER FIRE DEPT OPERATIONS ON BASE. (FOR THE REST OF THE REPORT

Reviewed By: GIRILLO Senior Officer: GIRILLO

EM

[illegible]

Investigations Field Report

Generated March 5, 1992 at 8:20 AM

EVENT No: 011486	DATE: 03/04/1992	TYPE INCND FUEL
Spill Cls:	Amt: 23,000 gals	C/F JP-4
FACIL No: FDI		Acft/Veh
Sit Rept: FUEL SPILL CREEK, CLASS 3		Equip Resp
Dispatched: 08:55	On Scene 09:01	Time In Svc 06:50
Fire Investigator: JJS		SR-OFFICER: CIRILLO
First Unit Crew Chief: CIRILLO		ACTION TAKEN OTHER
Assignment Response Time	6 Minutes	EST COST: 0
Pers Resp: RALPH, HICKS		Resp Orgn: CORP.
Phone: 93930		
Veh-ID:	DECAL:	Veh Lic No:

DAMAGE ASSESSMENT

CAUSE

HUMAN ERROR- CONTRACTOR BORED FENCE POST HOLE INTO 6" JP-4 FUEL LINE. [illegible] CONSTRUCTION IS THE PRIME CONTRACTOR. THIS IS THE ARMY JOB MONITORED BY THE ARMY CORP OF ENGINEERS. FUEL LOST IS APPROXIMATELY 20,000 TO 24,000 GAL. OF JP-4.

INVESTIGATOR'S SUMMARY

ON MONDAY CONTRACTOR INSTALLING POST ON THE FENCE AROUND [illegible] THEY BORED A HOLE INTO [illegible] FUEL LINE. TUESDAY NIGHT [illegible] FUELS PERSONNEL TRIED TO TRANSFER FUEL TO THE SOUTH [illegible] FUEL AREA BUT COULDN'T GET ANY PRESSURE UP [illegible]. THEY TRIED FOR APPROX. 30 MINUTES. THEY DIDN'T LOG THE TRANSFER BECAUSE OF SOME POLICY THAT SAYS TO ONLY LOG FULL TRANSFERS. [illegible] DIDN'T RECEIVE ANY FUEL, SO THERE WAS NO REPORT WRITTEN UP. THERE ALSO WAS NO REPORT WRITTEN UP THAT THEY COULDN'T GET THE LINE TO PRESSURE UP TO MAKE THE TRANSFER. THE FUEL RAN DOWN TOWER ROAD INTO [illegible] CREEK AND OFF BASE. WEDNESDAY BOOMS WERE PUT OUT IN THE CREEK ON BASE AND THREE DIFFERENT AREAS OFF BASE. ALL OFF BASE NOTIFICATION WERE MADE BY EM.

PERSONS INTERVIEWED	By Phone
RALPH HICKS	93930
RANDY GILRETH	94220

[illegible]
[illegible]

Generated March 5, 1992 at 9:31 AM

EVENT NUMBER 011493	Date: 02/04/1992	Type Event FUEL	
Shift On Duty BLUE	Dispatcher PJF	Senior Off GIRILLO	
Facility FD3	Acft/Veh/Bldg		Tail#
VehId	Decal #	Tag Number	
Sit Dept'd FUEL SPILL OPEN, CLASS 3		Dept'g Organ SP	
Reported By PROFFIT		By Phone hotline	
Locat'n VANDENBURG & MITCHELL			
Time Out 0[illegible]:55	On Scene [illegible]	In Svc 06:50	Resp Time 6
Equip Disp ENG1,SQD1,HIT1,CH2 ,[illegible]			
Crew Ch GIRILLO	Action Taken OTHER		
CHEM/FUEL TYPE JP-4	Spill Amt 25,000	Gls	
Injuries	Military [illegible]	Civilian [illegible]	Civil Service 0
On Scene Sup [illegible]	[illegible]	Taken OTHER	

UNIT	MANPWR $/H	EQUIP $/H	[illegible]	[illegible]	[illegible]	EQUIP COST	MANPWR COST
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	-	[illegible]	392.05
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	-	[illegible]	546.31
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	-	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	-	[illegible]	461.24
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	45.76
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	-	[illegible]	[illegible]	[illegible]	723.77
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	-	[illegible]	[illegible]	147.87	127.45
[illegible]	[illegible]	[illegible]	-	[illegible]	[illegible]	[illegible]	2,569.53
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	110.35
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	-	[illegible]	659.09
[illegible]	57.97	[illegible]	[illegible]	41	3	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	14	[illegible]	[illegible]	25.01
[illegible]	22.34	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	22.39

Page Number: 1

FIRE PROTECTION BRANCH
Event Invoice

>>>>>>>>>>>>>>> Totals for EVENT NUMBER 011495 <<<<<<<<<<<<<<<<<<<<<<<<<<<<<<

TOTAL ON SCENE MANHOURS	115.08	MEN ON SCENE	39
*EQUIPMENT COST	12,387.43	*MANPOWER COST	7,206.23
		*TOTAL COST ->	$ 19,593.66

FIRE PROTECTION BRANCH
Emergency Dispatch Log

Generated March 5, 1992 at 8:25 AM

DATE	ID#	TIME	LOG ENTRY
03/04/92	011496	08:55	** DISPATCH STARTED **
03/04/92	011496	:	ENG1,SQD1,HIT1,CH2 ,RMP1,
03/04/92	011496	:	INCIDENT: CHEM SPILL,CREEK,CLASS 3
03/04/92	011496	:	LOCATION: VANDENBURG & MITCHELL
03/04/92	011496	:	RCI
03/04/92	011496	:	
03/04/92	011496	:	NOTIF:PROFFIT :hotline
03/04/92	011496	09:01	UNITS ARE 10-14 AT THIS TIME
03/04/92	011496	09:0[illegible]	CH 1 REPORTS A SMELL A CHEMICAL IN THE
03/04/92	011496	:	CREEK
03/04/92	011496	09:0[illegible]	CH 1 REPORTS HE IS GOING BY THE 507TH
03/04/92	011496	:	AREA TO SEE IF IT IS THE SOURCE OF THE
03/04/92	011496	:	SPILL
03/04/92	011496	[illegible]	CH2 TO RMP 1 [illegible] GO BACK AND HOOK UP
03/04/92	011496	:	THE HAZMAT TRAILER AND GET SOME BOOMS
03/04/92	011496	09:0[illegible]	HIT1 REPORTS A FILM IN THE CREEK AT THE
03/04/92	011496	:	CORNER OF MITCHELL AND VANDENBERG
03/04/92	011496	09:07	MIDWEST CITY COMMAND REPORTS A FUEL
03/04/92	011496	:	SPILL IN THE CREEK BUT IT IS NOT RE-
03/04/92	011496	:	LATED TO THE TINKER SPILL
03/04/92	011496	09:07	ENG 1 REPORTS THERE IS FUEL IN MIDDLE
03/04/92	011496	:	OF THE STREAM
03/04/92	011496	09:09	RMP 1 RESPONDING WITH THE HAZMAT TRLR

Page Number: 1

FIRE PROTECTION BRANCH
Emergency Dispatch Log

DATE	ID#	TIME	LOG ENTRY
03/04/92	011496	09:09	HIT 1 REPORTS THEY NEED A BOOM AT THE
03/04/92	011496	:	PERIMITER FENCE, SOURCE OF SPILL IS
03/04/92	011496	:	UNKNOWN
03/04/92	011496	09:09	CH1 IS AT THE 507TH AREA
03/04/92	011496	09:10	CH2 REPORTS THE COMMAND LOCATION IS AT
03/04/92	011496	:	WOLF AND MITCHELL
03/04/92	011496	09:11	CH 2 REQUEST THAT ENG 4 BE RESPONDED
03/04/92	011496	09:12	EN 4 IS DISPATCHED
03/04/92	011496	09:14	CH2 RESPONDS ENG2 TO THE AWACS FUEL YARD
03/04/92	011496	:	TO LOOK FOR THE SOURCE
03/04/92	011496	09:16	ENG 2 IS RESPONDING TO THE FUEL YARD
03/04/92	011496	09:18	CH1 REPORTS NEED TO SHUT OFF VALVE WEST
03/04/92	011496	:	OF 507TH TO HOLD SPILL
03/04/92	011496	09:19	CH2 REPORTS THERE ARE NO FUEL MOVEMENTS
03/04/92	011496	:	EXCEPT TRAILERS
03/04/92	011496	09:19	ENG 2 IS 10-14
03/04/92	011496	09:20	CH2 TO ENG 2 YOU NEED TO SHUT THE VALVES
03/04/92	011496	:	AT THE 507TH AREA
03/04/92	011496	09:22	ENG 2 REPORTS THERE IS NOTHING IN THE
03/04/92	011496	:	DRAIN AND IN THE CREEK
03/04/92	011496	09:24	ENG2 REPORTS THE ROAD GOING TO THE TOWER
03/04/92	011496	:	IS SATURATED WITH FUEL
03/04/92	011496	09:24	CH1 IS GOING TO THE AWACS FUEL YARD TO
03/04/92	011496	:	CHECK

FIRE PROTECTION BRANCH
Emergency Dispatch Log

DATE	ID#	TIME	LOG ENTRY
03/04/92	011496	09:25	ENG 2 REPORTS LARGE CONCENTRATIONS OF
03/04/92	011496	:	FUEL ALONG THE CREEK BUT NOT UPSTREAM OF
03/04/92	011496	:	THE BRIDGE
03/04/92	011496	09:27	CH1 IS AT THE AWACS FUEL YARD
03/04/92	011496	09:28	CH2 REPORTS HE WILL SEND AN EM REP TO
03/04/92	011496	:	THE 507TH AREA
03/04/92	011496	09:29	AMP1 REPORTS THERE IS A BOOM ACROSS THE
03/04/92	011496	:	CREEK AT THE FENCE
03/04/92	011496	09:31	CH1 REPORTS THERE IS NOTHING ABNORMAL
03/04/92	011496	:	AT THE AWACS FUEL YARD
03/04/92	011496	09:12	LATE ENTRY ALL NOTIFICATIONS MADE
03/04/92	011496	09:36	CH2 TELLS ENG 2 TO WALK THE CREEK
03/04/92	011496	09:38	ENG2 REPORTS THEY ARE CLOSING THE VALVE
03/04/92	011496	:	AND THERE IS A LARGE CONCENTRATION OF
03/04/92	011496	:	FUEL ALONG THE CREEK WEST OF THE 507TH
03/04/92	011496	:	PUMP
03/04/92	011496	09:40	ENG 2 REPORTS THE DRAINS ARE CLOSED
03/04/92	011496	09:40	CH2 TO ENG 2 CAN YOU GIVE AND ESTIMATE
03/04/92	011496	:	ON THE AMOUNT
03/04/92	011496	09:40	ENG 2 CAN NOT GIVE THE AMOUNT OF THE
03/04/92	011496	:	SPILL
03/04/92	011496	09:45	MIDWEST CITY HAS UNITS SET UP ON 29TH
03/04/92	011496	:	BY SAMS ACROSS FROM THE GOLF COURSE AND
03/04/92	011496	:	IS SENDING AN EM REP TO THAT LOCATION

FIRE PROTECTION BRANCH
Emergency Dispatch Log

DATE	ID#	TIME	LOG ENTRY
03/04/92	011496	09:47	CH2 TO RMP 1 COME TO CH2 LOCATION AND
03/04/92	011496	:	SET UP ADDITIONAL BOOMS TO PREVENT
03/04/92	011496	:	ADDITIONAL SPILL FROM LEAVING THE BASE
03/04/92	011496	09:52	CH2 REQUEST THE WELDING INSPECTOR TO
03/04/92	011496	:	GO TO 1005 AND BRING A LOAD OF BOOMS TO
03/04/92	011496	:	HIS LOCATION
03/04/92	011496	09:59	RMP1 AND ENG3 STANDING BUY AT COOK AND
03/04/92	011496	:	MITCHELL
03/04/92	011496	10:05	CH2 REQUEST ROADS AND GROUNDS TAKE A
03/04/92	011496	:	LOAD OF SAND TO ENG 2 AND THEY WILL SHOW
03/04/92	011496	:	THEM WHERE TO DUMP IT
03/04/92	011496	10:08	FIRE CHIEF TO CH2 CAN SOMEONE GO TO
03/04/92	011496	:	1020 AND TAKE THE TRAILER TO THE MIDWEST
03/04/92	011496	:	COMMAND POST
03/04/92	011496	10:10	FIRE CHIEF TO CH2 HAVE SOMEONE GO TO
03/04/92	011496	:	1007 AND GET WHITE BOOMS AND TRANSPORT
03/04/92	011496	:	THEM TO [illegible]
03/04/92	011496	10:12	UTILITIES CONTROL REPORTS THE SAND IS
03/04/92	011496	:	ENROUT
03/04/92	011496	10:13	ENG2 LOCATION IS 1146 AND UTILITIES 4 IS
03/04/92	011496	:	GOING TO THEIR LOCATION
03/04/92	011496	10:14	CH2 DIRECTS THAT TINKER COMMAND POST BE
03/04/92	011496	:	LOCATED AT BLDG 1029
03/04/92	011496	10:15	ENG 2 REQUESTS A LIQUID FUEL REP BE SENT

FIRE PROTECTION BRANCH
Emergency Dispatch Log

DATE	ID#	TIME	LOG ENTRY
03/04/92	011496	:	TO HIS LOCATION
03/04/92	011496	10:17	MCP IS ENROUT
03/04/92	011496	10:19	ENG 2 REPORTS THERE IS 200 FT OF BOOM ON
03/04/92	011496	:	THE TRAILER
03/04/92	011496	10:46	* MCP RELOCATED TO 29TH .5MI OF AIR DEPO
03/04/92	011496	:	DEPOT.
03/04/92	011496	:	.
03/04/92	011496	10:47	* CH2 REPORTS THE SOURCE OF LEAK AND
03/04/92	011496	:	HAS STOPPED SOURCE.
03/04/92	011496	10:19	CH2 REQUEST THAT RMP1 GO TO 1020 GET
03/04/92	011496	:	TRAILER AND TAKE IT TO MND
03/04/92	011496	10:21	RMP 1 RESPONDING
03/04/92	011496	10:22	CH2 REQUEST THAT THE CORPS OF ENGINEERS
03/04/92	011496	:	BE CALLED AND THEY SEND A REP WHO KNOWS
03/04/92	011496	:	ABOUT THE NAVY PROJECT TO HIS LOCATION
03/04/92	011496	10:26	HIT 1 ASKED RMP 1 HIS ETA
03/04/92	011496	10:26	RMP 1 REPORTS HIS ETA TO 5 MIN
03/04/92	011496	10:27	CH2 REPORTS A POSSIBLE LEAK IN THE LINE
03/04/92	011496	:	AT TOWER RD AND NORTH OF NAVY AREA
03/04/92	011496	10:31	FIRE CHIEF REQUESTS THE MCP BE RELOCATED
03/04/92	011496	:	TO 29TH ST
03/04/92	011496	10:34	RMP 1 REPORTS CREEK IS BOOMED AT
03/04/92	011496	:	VANDENBURG AND MITCHELL
03/04/92	011496	11:00	* WIND 180 AT 14 TEMP 14 WET GROUND

FIRE PROTECTION BRANCH
Emergency Dispatch Log

DATE	ID#	TIME	LOG ENTRY
03/04/92	011496	:	.
03/04/92	011496	:	* MCP RELOCATED FROM 29TH STREET .5 MI
03/04/92	011496	:	WEST OF AIR DEPOT TO SAM'S PARKING LOT
03/04/92	011496	:	SOUTH END ALONG 29TH STREET.
03/04/92	011496	10:41	RMP1 REPORTS HE IS GOING TO 15TH AND
03/04/92	011496	:	VICKY THEN TO 15TH AND SOONER WITH MWC
03/04/92	011496	:	HAZMAT
03/04/92	011496	10:42	CH2 TO ENG2 HAVE YOU DETERMINED IF THIS
03/04/92	011496	:	IS JP4, JP5 OR DEISEL FUEL
03/04/92	011496	10:43	ENG2 REPORTS IT IS JP4
03/04/92	011496	10:46	CH1 TO CH2 THE CORP OF ENGINEERS IS ON
03/04/92	011496	:	ROUTE AND HE IS SENDING HIM TO HIS
03/04/92	011496	:	LOCATION
03/04/92	011496	10:46	CH1 REPORTS THE LEAK HAS STOPPED
03/04/92	011496	10:51	ENG 2 IS 10-19
03/04/92	011496	11:05	CH1 REPORTS ELECTRICIANS ARE ON SCENE
03/04/92	011496	:	AND TOWER WILL GO ON BACKUP POWER
03/04/92	011496	11:0[illegible]	CH 2 REPORTS FUEL HAS RUN INTO AN
03/04/92	011496	:	ELECTRICAL MAN-HOLE AND POWER WILL BE
03/04/92	011496	:	SHUT OFF TO THE SOUTH 40
03/04/92	011496	11:09	CH2 REPORTS THAT ALL UNITS CAN 10-8,10-
03/04/92	011496	:	19 EXCEPT FOR RMP 1,TRAILER AND THE MCP
03/04/92	011496	11:10	RMP2 REPORTS THEY WILL HELP MWC AND THEN
03/04/92	011496	:	GO TO 29TH MIDWEST BLVD

FIRE PROTECTION BRANCH
Emergency Dispatch Log

DATE	ID#	TIME	LOG ENTRY
03/04/92	011496	11:12	CH2 REQUESTS FRESH BATTERIES BE SENT TO
03/04/92	011496	:	HIS LOCATION
03/04/92	011496	11:17	CH2 REQUESTS THAT THE TOWER AND BASE OPS
03/04/92	011496	:	BE NOTIFIED OF THE UPCOMING POWER LOSS
03/04/92	011496	11:18	HQ INFORMED THE TOWER AND BASE OPS OF
03/04/92	011496	:	THE POWER LOSS AND THEY REPLIED IT IS NO
03/04/92	011496	:	PROBLEM
03/04/92	011496	11:30	CH2 REPORTS ELECTRICIANS HAVE DISCONNECT
03/04/92	011496	:	ED POWER TO MANHOLE AT THE TOWER AND
03/04/92	011496	:	TOWER IS ON BACKUP POWER
03/04/92	011496	11:35	CH1 REQUESTS A SP UNIT TO BE SENT TO
03/04/92	011496	:	TOWER ROAD NORTH OF NEW NAVY FACILITY
03/04/92	011496	:	FOR [illegible]
03/04/92	011496	11:37	CH2 REPORTS MANHOLE IS FULL AND CH2 WILL
03/04/92	011496	:	CHECK UNDER TOWER
03/04/92	011496	12:02	CH2 REQUESTS THAT CTS BE DISPATCHED TO
03/04/92	011496	:	ASSIST AND STANDBY WHILE PERSONNEL ARE
03/04/92	011496	:	DIGGING UP A [illegible]
03/04/92	011496	12:04	CTS [illegible]
03/04/92	011496	12:08	CTS 10-[illegible]
03/04/92	011496	12:10	* CH1 [illegible] THAT APPROX [illegible],000 GALLONS
03/04/92	011496	:	OF THE SUBSTANCE WAS INVOLVED.
03/04/92	011496	12:13	* CH1 REQUESTS THE NUMBER OF BOOMS AVAIL
03/04/92	011496	12:15	HIT 1 REPORTS USPCI PUMPING OUT ELECTR.

Page Number:

FIRE PROTECTION BRANCH
Emergency Dispatch Log

DATE	TCK#	TIME	LOG ENTRY
03/04/92	011496	:	MANHOLE AND THEY ARE DIGGING UP THE LINE
03/04/92	011496	12:19	* CH2 ESTIMATES 161 HIT1 IS RESEARCHING
03/04/92	011496	:	THE TOTAL BASE AVAILABILITY - HIT1 HAS
03/04/92	011496	:	40' ON HIT1.
03/04/92	011496	12:48	* RMP3 REQ 100' OF ROPE - ROPE CUTTER -
03/04/92	011496	:	5PCS OF 5/8" REBAR APPROX 5' - SLEDGE
03/04/92	011496	:	HAMMER AND 50' OF HIGH QUALITY BOOM.
03/04/92	011496	13:10	HIT1 REQUEST THE WELDING INSPECTOR TO
03/04/92	011496	:	RESPOND AND GO TO IWTP AND BRING 100 FT
03/04/92	011496	:	OF BOOMS AND REBAR AND ROPE FROM CE
03/04/92	011496	:	WELDING SHOP
03/04/92	011496	13:35	CH2 REPORTS USPCI AND CM WILL REMAIN ON
03/04/92	011496	:	SCENE, CH1 IS LEAVING SCENE AND REPORTS
03/04/92	011496	:	IT WILL TAKE APPROX. 2 1/2 HOURS TO PUMP
03/04/92	011496	:	IT OUT
03/04/92	011496	13:50	ADVISED PUMP 3 THAT INSPECTOR 409 AND
03/04/92	011496	:	TUG 1 IS RESPONDING TO HIS LOCATION
03/04/92	011496	:	WITH EQUIPMENT REQUESTED
03/04/92	011496	15:00	PUMP 3 MOVING TO 80TH AND MIDWEST BLVD
03/04/92	011496	:	HIT 1 AT 80TH AND MIDWEST BLVD AND THEY
03/04/92	011496	:	NEED TO PUT OUT MORE BOOMER AT 80TH AND
03/04/92	011496	:	MIDWEST BLVD
03/04/92	011496	15:03	PUMP 3 REQUEST FUEL FOR RAMP 3 NOTIFIED
03/04/92	011496	:	FUEL YARD

FIRE PROTECTION BRANCH
Emergency Dispatch Log

DATE	ID#	TIME	LOG ENTRY
03/04/92	011496	15:15	RAMP 3 AND ENG 1 10-14 AT 50TH AND
03/04/92	011496	:	MIDWEST BLVD
03/04/92	011496	15:25	NOTIFIED OKLA CITY POLICE FOR TRAFFIC
03/04/92	011496	:	CONTROL ON 36TH 1/2 MILE NORTH OF
03/04/92	011496	:	MIDWEST BLVD
03/04/92	011496	15:28	HIT 1 REPORTS PUTTING OUT MORE BOOMS AT
03/04/92	011496	:	RAILROAD TRACKS ON MIDWEST BLVD.
03/04/92	011496	15:46	RAMP 3 REPORTS THEY ARE FINISH AT 50TH
03/04/92	011496	:	AND MIDWEST BLVD. GOING TO 36TH AND
03/04/92	011496	:	MIDWEST BLVD NOW.
03/04/92	011496	15:54	ENG 4 10-19
03/04/92	011496	16:27	RAMP 1 AND ENG 1 RETURNING TO BASE NOW.
03/04/92	011496	:	HIT 1 OUT WITH EM TO VICKI AND RENO NOW.
03/04/92	011496	16:32	RAMP 1 10-8 ON TOWER ROAD
03/04/92	011496	16:37	RAMP 1 BACK ON BASE
03/04/92	011496	17:11	HIT 1 REPORTS PUT OUT MORE BOOMS AT
03/04/92	011496	:	RENO AND VICKI. HIT 1 AND EM GOING TO
03/04/92	011496	:	SPILL SITE NOW.
03/04/92	011496	17:4[illegible]	AT 1622 RAMP 1 WENT TO DO A SPOT INSPECT
03/04/92	011496	:	ION ON THE FUEL SPILL AREA. THE PERSON-
03/04/92	011496	:	NEL ON SCENE WERE FILLING ONE MAN HOLE
03/04/92	011496	:	PIT FULL OF WATER TO TRY AND FLOW THE
03/04/92	011496	:	RESIDUAL FUEL TO ANOTHER MAN HOLE PIT
03/04/92	011496	:	COVER WHERE THEY ARE PUMPING OUT THE

FIRE PROTECTION BRANCH
Emergency Dispatch Log

DATE	IDS	TIME	LOG ENTRY
03/04/92	011496	:	PIT INTO A TRUCK. I ALSO TALKED TO SSGT
03/04/92	011496	:	JENKINS ABOUT WHEN THEY WILL BE PUTTING
03/04/92	011496	:	POWER TO THE ELECTRICAL WIRES. IN THE
03/04/92	011496	:	MANHOLE PITS. AND IF THEY WOULD NEED ANY
03/04/92	011496	:	F.D. ASSISTANCE. HE STATED THAT THEY
03/04/92	011496	:	WOULD TRY AND PUT POWER TO THE ELECT-
03/04/92	011496	:	RICAL WIRING TONIGHT SOMETIME AND IF
03/04/92	011496	:	THERE WAS NO DAMAGE TO THE WIRING SYSTEM
03/04/92	011496	:	THAT THEY WOULD NOT NEED ANY FURTHER
03/04/92	011496	:	ASSISTANCE FROM F.D.
03/04/92	011496	17:40	**CREW CHIEF'S REPORT CONTINUED**
03/04/92	011496	:	IT APPEARED THAT THE ALL THE FUEL HAD
03/04/92	011496	:	LEFT THE [illegible] TOWARD MIDWEST CITY DUE TO
03/04/92	011496	:	THE HEAVY RAINS DURING THE NIGHT WITH
03/04/92	011496	:	SMALL POCKETS OF FUEL IN THE CREEK ON
03/04/92	011496	:	[illegible]. [illegible] WITH EM TRAILER #2 RESPONDE
03/04/92	011496	:	D TO ASSIST MIDWEST CITY FD FROM CRUTCHO
03/04/92	011496	:	[illegible] [illegible] TO [illegible] STREET JUST BEFORE
03/04/92	011496	:	THE [illegible] RIVER. ENGINE 1 WAS DISPATC
03/04/92	011496	:	H FOR MANPOWER. [illegible] WAS ON SCENE PUMPI
03/04/92	011496	:	NG OFF THE CREEK AND ELECTRIC MANHOLES
03/04/92	011496	:	SOUTH OF THE CONTROL TOWER. ELECTRIC POW
03/04/92	011496	:	ER WAS KILLED TO THE TOWER. TOWER WAS
03/04/92	011496	:	PUT ON BACKUP GENERATOR. THE SITE OF

FIRE PROTECTION BRANCH
Emergency Dispatch Log

DATE	ID#	TIME	LOG ENTRY
03/04/92	011496	:	THE PIPELINE BREAK WAS TURNED OVER TO
03/04/92	011496	:	THE CORE AND CONTRACTOR FOR REPAIRS.
03/04/92	011496	19:12	MIDWEST CITY FIRE DEPT REPORTS THEY HAVE
03/04/92	011496	:	CHECK BOOMS ON 50TH AND DEL CITY AREA
03/04/92	011496	:	NOTIFIED CHIEF 2 AND 403
03/04/92	011496	19:23	MOTOR POOL 10-14 TO CHECK BATTERY ON CE
03/04/92	011496	:	HIGH RISE VEHICLE
03/04/92	011496	19:29	403 REQUEST TRUCK TO STANDBY ON TOWER
03/04/92	011496	:	ROAD. NOTIFIED CHIEF 2
03/04/92	011496	19:30	CRASH 2 OUT TO STANDBY
03/04/92	011496	19:47	HIT 1 REPORTS POWER BACK ON. TOWER SHOU-
03/04/92	011496	:	LD BE BACK ON COM. POWER NOW. POWER
03/04/92	011496	:	PROD. WILL CHECK TOWER
03/04/92	011496	19:50	CRASH 2 10-19
03/04/92	011496	19:54	HIT 1 10-8 AT 1 STATION
03/04/92	011496	19:58	CRASH 2 10-8 AT 2 STATION
03/04/92	011496	20:06	CHIEF 2 AND 403 OUT TO CHECK THE CREEKS
03/04/92	011496	20:37	CHIEF 2 AND HIT 1 OFF BASE TO VICKIE AND
03/04/92	011496	:	RENO
03/04/92	011496	20:49	CHIEF 2 REPORTS CHECK ALL THE BOOMS ON
03/04/92	011496	:	BASE ON OFF BASE AND EVERYTHING IS OK
03/04/92	011496	20:57	CHIEF 2 AND HIT 1 BACK ON BASE
03/05/92	011496	01:42	RAMP1 TO CHECK BOOMS ON CREEK
03/05/92	011496	01:57	RAMP 1 REPORTS ALL 3 CREEK AREAS ON BASE

FIRE PROTECTION BRANCH
Emergency Dispatch Log

DATE	IDS	TIME	LOG ENTRY
03/05/92	011496	:	CHECKED AND OKAY,GOING TO CHECK CREEK
03/05/92	011496	:	AREA ON VICKI,OFF BASE
03/05/92	011496	02:17	RMP1 REPRTS CREEK AT VICKIE AND RENO
03/05/92	011496	:	CHECKS OK. BACK ON BASE AND CREEK CHECK
03/05/92	011496	:	COMPLETE.
03/05/92	011496	05:00	RMP1 OUT TO CHECK ROOMS IN THE CREEK
03/05/92	011496	05:23	RMP 1 CHECKED CREEKS,ALL OKAY 10-8
03/05/92	011496	05:50	*** RUN TERMINATED ***

--- End of Report ---

TAFB ENVIRONMENTAL MANAGEMENT DIRECTORATE

FUEL/CHEMICAL SPILL SUMMARY

JP-4 RELEASE ALONG TOWER ROAD

1. On 04 Mar 92 at 0855, JP-4 was discovered in Crutcho Creek.

2. The release was attributed to a damaged hydrant system transfer line. The line was damaged when Blondt Construction inadvertently punctured the six inch fiberglass pipe while installing the new fence around the Navy facility. The release occurred when the liquid fuels contractor attempted to transfer fuel to the AWAC fuel farm at around 2000 on 3 Mar 92. The fuel transfer procedures were discontinued when the system failed to build pressure after about 30 minutes.

3. Upon location of the leak, the transfer line was shut down and evacuated. Personnel from Blondt Construction applied sand to the fuel which had pooled near the area where the leak was discovered. Additionally, they plugged the line and dispatched personnel to Tulsa for materials to make repairs to the line. Bioenvironmental engineering responded and conducted LEL tests in nearby electrical manholes to facilitate safe flushing and pumping of fuel. The base waste transportation contractor then pumped fuel from the electrical manholes, ditches, and the creek.

3. Representatives from the Tinker and Midwest City Fire Departments set up a temporary Command Post on the south side of SE 29th Street, south of the Sam's Wholesale parking lot. Another Command Post was set up near Tower Road. Creek booms were loaded onto Tinker spill trailers and dispatched to the bridge on Vickie 1/4 mile north of Reno. More booms were dispatched to a location 1/2 mile north of NE 36th Street on Midwest Blvd. Additionally, booms were delivered to NE 36th Street about 3/4 mile west of Midwest Blvd. Personnel from Fire Departments located at Tinker, Spencer, Midwest City, and Oklahoma City worked together to install over 40 booms in Crutcho Creek outside the Tinker boundaries.

5. The Environmental Management is overseeing the contaminated soil removal operation at the site. The soil is being placed on 10 mil poly sheeting. Following the removal of all contaminated soil from the spill site, a dike will be installed around the piled soil. The material will then be sampled and air dried. All creek booms will be monitored daily and removed following the next episode of rain or in about two weeks. Inspections of off-base creeks on 05 Mar 92 indicated all sheen had been removed by the booms.

Tube 1943Z

MSG HSB857

IMMEDIATE

DATE: 064
TIME: 1941

OC-ALC/CC
CV
EM
PA
2854 ABG/CC
FMP

OAAUZYUW RUVOARA4217 0641940-UUUU--RUVOAFA.
ZNR UUUUU
O 041715Z MAR 92
FM OC ALC TINKER AFB OK//FMPOC//
TO AIG 9425
ACCT AF ACXJRF
BT
UNCLAS JOPREP JIFFY//
MSGID/OPREP-3H/OC-ALC/004/FEB//
REF/A/VMG/OC-ALC, FMPOC/041456ZFEB92/004//
AMPN/REF A IS A OPREP-3 HOMELINE VOICE REPORT//
REF/A/VMG/OC-ALC, FMPOC/221455ZJAN92/001//
AMPN/OPREP-3 HOMELINE VOICE MSG//
FLAGWORD/HOMELINE/-//
TIMELOC/041456Z/TINKER AFB OK//
GENTEXT/ AT APPROXIMATELY 041456Z MAR 92 A SECURITY POLICE PATROL DISCOVERED WHAT APPEARED TO BE A FUEL SLICK IN CRUCHO CREEK. THE BASE FIRE DEPARTMENT RESPONDED AND DISCOVERED AN UNDERGROUND FUEL LINE BROKEN AND LEAKING JP-4 FUEL. IT APPEARS THAT A BASE CONTRACTOR INSTALLING A SECURITY FENCE CAUSED DAMAGE TO THE FUEL LINE WHILE DIGGING FENCE POST HOLES. APPROXIMATELY 20,000 GALLONS OF FUEL ENTER THE CREEK. BOTH THE BASE FIRE DEPARTMENT AND ENVIRONMENTAL WITH

PAGE 2 RUVOARA4217 UNCLAS JOPREP JIFFY//
ASSISTANCE FROM BOTH MIDWEST CITY AND DEL CITY FIRE DEPARTMENTS ARE INVOLVED IN THE CLEANUP. IT IS ESTIMATED THAT DUE TO HEAVEY RAINS THE FUEL WAS WELL DELUTED. NO ENVIRONMENTAL OR ADVERSE HEALTH CONDITIONS ARE EXPECTED. LOCAL MEDIA INTEREST WAS MODERATE. RULE 14 APPLIES. FURTHER REPORTING THROUGH ENVIRONMENTAL CHANNELS.
BT
#4217
NNNN

APPROXIMATE DATE OF RELEASE: Mar 5, 1992, 9:48 a.m.

MATERIAL RELEASED: Non-hazardous Treated Industrial Wastewater Sludge.

AMOUNT RELEASED: 500-1000 gallons (estimated)

LOCATION OF RELEASE: The release occurred at the Tinker AFB Industrial Wastewater Treatment Plant (IWTP) effluent discharge.

RESPONSE ACTIONS: A valve located on a crossover line near the bottom of a treated industrial wastewater holding tank failed. This allowed the sludge which had built up in the tank to drain to the tank discharge line which terminates at the plant effluent. Base organizations responded and built a dam downstream from the plant. The base waste transportation contractor responded and pumped the creek until clean water standards were met.

02 061652Z MAR 92 RR UUUU EM

NO

OC ALC TINKER AFB OK//EM//

HQ AFLC TINKER AFB OK//EMC//

INFO HQ USAF WASHINGTON DC//LEEV//

HQ AFESC TYNDALL AFB FL//DEVP/PA/DEMM//

HQ AFMSC BROOKS AFB TX//SGP//

USAF OEHL BROOKS AFB TX//ECW//

ZEN 2854ABG TINKER AFB OK//CC//

ACCT AF ACXJRF

UNCLAS

1. NAME OF INSTALLATION: TINKER AFB, OK

2. INCIDENT REPORT NUMBER: INITIAL/FINAL

3. DATE/TIME OF INCIDENT: 05 MAR 92/0948 HRS

4. SEVERITY OF INCIDENT: MINOR/NO DAMAGE TO FISH OR WILDLIFE

5. LOCATION OF SPILL: TINKER INDUSTRIAL WASTEWATER TREATMENT FACILITY/SOLDIER CREEK

6. CAUSE OF INCIDENT: DRAIN VALVE ON THE TREATED INDUSTRIAL WASTEWATER STORAGE TANK FAILED

7. TYPE AND AMOUNT OF POLLUTANT: 500 - 1000 GALLONS OF NON-HAZARDOUS SLUDGE

8. DAMAGE IMPACT ON SURROUNDINGS: NONE DETECTED

JUDY RAMSEY
EMC, 43002

for ROBERT L. REED, CHIEF EMC
CRC: 4003

0: 02 061652Z MAR 92 RR UUUU EM

NO

9. CORRECTIVE ACTION TO ELEMINATE SOURCE: LINE ISOLATED/VALVE TO BE REPLACED

10. CORRECTIVE ACTION TO REMOVE POLLUTANT: SOLDIER CREEK BLOCKED WITH SAND/120000 GALLONS OF CREEK WATER AND SLUDGE PUMPED AND OFF LOADED INTO FRAC TANKS.

11. ASSISTANCE REQUIRED: TINKER FIRE DEPARTMENT, ENVIRONMENTAL MANAGEMENT, BIOENVIRONMENTAL ENGINEERING, SAFETY, AND CIVIL ENGINEERING

12. ESTIMATED DATE OF REMEDIAL ACTION COMPLETION: 06 MAR 92

13. ANTICIPATED NEWS REACTION: PRESS RESPONDED AND FILMED OFF BASE ACTIVITIES/PA COORDINATED ALL MEDIA ACTIVITIES

14. NOTIFICATIONS: OKLAHOMA WATER RESOURCES BOARD, EPA REGION 6

15. SPILL PLAN INPLEMENTATION: CIVIL ENGINEERING

JUDY RAMSEY
EMC, 43002

ROBERT L. REED, CHIEF EMC
CRC: 4003

LABORATORY ANALYSIS REPORT
ENVIRONMENTAL LABORATORY
OC-ALC/EMC
Tinker AFB, Ok 73145

Subject: Spill at Crutcho Creek
Submitter: OC-ALC/EMCO
Submit Date: Ø4 Mar 92
Report Date: Ø4 Mar 92

Background: A sample of water from Crutcho Creek was submitted for analysis for Chemical Oxygen Demand (COD) and organics.

Note: All results are reported in milligram per liter (mg/l).

Data:

pH	8.1
COD	49 ppm

Analysis on Headspace/gas chromatography was negative.

Remarks: If additional analyses or information are needed, please contact Jane Kuehnert, x65871.

D. Deane Carlberg, Jr.
Supervisory Chemist, GS-12
Environmental Laboratory
Environmental Compliance Division

Jane Kuehnert
Chemist, GS-11

LABORATORY ANALYSIS REPORT
ENVIRONMENTAL LABORATORY
OC-ALC/EMC
Tinker AFB, Ok 73145

Subject: IWTP Spill at Soldier Creek
Submitter: OC-ALC/EMCO
Submit Date: 05-06 Mar 92
Report Date: 06 Mar 92

Background: Samples of water from the IWTP spill into Soldier Creek were submitted for analysis. The samples were identified as follows:

Sample 1: No ID
Sample 2: Soldier Creek/I40 920305
Sample 3: Soldier Creek/I40 920305
Sample 4: Site #1, Soldier Creek/I40 920306

Note: All results are reported in milligram per liter (mg/l).

Data:

Sample	1	2	3	4
pH	7.7	7.7	6.8	6.9
Arsenic	<.001	0.002	0.011	<.001
Barium	0.64	0.61	0.73	0.61
Cadmium	<.001	<.001	<.001	<.001
Chromium	<.001	<.001	<.001	<.001
Lead	<.002	<.002	<.002	<.002
Mercury	<.007	<.007	<.007	<.007
Selenium	<.001	<.001	<.001	<.001
Silver	<.003	<.003	0.011	0.004
Headspace/GC	Neg	Neg	Neg	N/A

Remarks: If additional analyses or information are needed, please contact Jane Kuehnert, x65871.

D. Deane Carlberg, Jr.
Supervisory Chemist, GS-12
Environmental Laboratory
Environmental Compliance Division

Jane Kuehnert
Chemist, GS-11

FIRE PROTECTION BRANCH
Investigators Field Report

EVENT No: 011504	DATE: 03/05/1992	TYPE INCND CHEMICAL
Spill Cls: 3	Amt: 1,000 gals	C/F HEAVY SEWER SLUDGE
FACIL No: FD4		Acft/Veh
Sit Rept: CHEM SPILL,CREEK,CLASS 3		Equip Resp
Dispatched: 09:48	On Scene 09:52	Time In Svc 17:17
Fire Investigator: AJS		SR-OFFICER: HENSLEY
First Unit Crew Chief: HENSLEY		ACTION TAKEN
Assignment Response Time 4 Minutes		EST COST: 0
Pers Resp: BOB, WOODS		Resp Organ: DEMSW
Phone: 43114		
VEH-ID:	DECAL#:	Veh Lic No:

DAMAGE ASSESSMENT

CAUSE

HUMAN ERROR- FOUND VALVE PARTLY OPEN AND DUMPED TREATED INDUSTRIAL WASTE INTO CREEK.

INVESTIGATOR'S SUMMARY

FIRE DEPT. HAD ROADS AND GROUNDS BLOCK THE CREEK JUST SOUTH OF I-40. USPCI PUMPED MOST OF THE DAY. TEST OF WATER SAMPLES INDICATED THE PH WAS OK AND THERE WERE NO METAL IN THE WATER BUT USPCI PUMPED PRECAUTIONARY MEASURE.

PERSONS INTERVEIWED	Dy Phone
JOE GARDE	43114
CONNIE WHITE	43002
DAN LUTON	42010

FIRE PROTECTION BRANCH
Event Invoice

EVENT NUMBER 011504	Date: 03/05/1992	Type Event CHEMICAL
Shift On Duty BLUE	Dispatcher RJF	Senior Off HENSLEY
Facility FD4	Acft/Veh/Equip	Tail#
VehId	Decal #	Tag Number
Sit Rept'd CHEM SPILL,CREEK,CLASS 3		Rept'g Organ DE
Reported By BAXTER		Dy Phone 43114
Locat'n BEHIND WATER & WASTE		
Time Out 09:48	On Scene 09:52	In Svc 17:17
Resp Time 4		
Equip Disp ENG3,SQD1,HIT1,CH2 ,RMP3,		
Crew Ch HENSLEY	Action Taken	
CHEM/FUEL TYPE HEAVY SEWER SLUDGE	Spill Amt 1,000	Cls 3
Injuries	Military 0	Civilian 0
Civil Service 0		
On SceneRep JOE GUARD	Phone 4-3114	Organ DE

UNIT	MANPWR P/H	EQUIP P/HR	HRS	MIN	MEN	EQUIP COST	MANPWR COST
ENG3	60.69	427.39	1	31	4	645.35	367.78
SQD1	46.02	49.39	2	2	3	100.26	280.72
CH2	26.28	30.49	2	3	1	62.50	53.87
RMP3	20.34	49.39	2	7	1	104.21	42.91
HIT1	50.97	490.39	7	29	3	3,668.11	1,144.27

>>>>>>>>>>>>>> Totals for EVENT NUMBER 011504 <<<<<<<<<<<<<<<<<<<<<<<<<<<<

TOTAL ON SCENE MANHOURS	38.77	MEN ON SCENE	12
*EQUIPMENT COST	4,580.43	*MANPOWER COST	1,889.55
		*TOTAL COST ->	$ 6,469.98

TINKER AIR FORCE BASE
DIRECTORATE OF
ENVIRONMENTAL MANAGEMENT

SPILL REPORT FORM

(Complete all blanks, use reverse side of form if necessary)

EM Contact: H. RALEIGH Report date: 5 MAR 92

Incident control #: ________ Date: ________ Time: ________

Severity: ________ Responding agencies: OWRB, City/County Health

Location (include water bodies impacted): IWTP East on Soldier Creek to I-40 Underpass

Cause: Human error ________ Equipment failure X Procedure ________

Pressure related ________ Other ________

Remarks: ________

Pollutant: INDUSTR/SEPTIC SLUDGE Amount: 500-1000g How estimated: ________

Reportable quantity under CERCLA? ________ (If yes, complete all items on page 2)

Samples collected? YES Results: CLEAN

Damage to soil, fish, wildlife, government property? POLLUTANT WAS HEAVY AND SANK TO BOTTOM OF CREEK

Action taken to eliminate pollution source: YES

Agency conducting cleanup: YES

Assistance required during cleanup: NO

Estimated completion date of remedial action: 6 MAR 91

Long term remediation required? YES

How was release reported to Fire Dept/Em? ?

EDR required? ________ Why? ________

FIRE PROTECTION BRANCH
Assistant Fire Chief's Daily Report (Perm)

Generated March 6, 1992 at 8:15 AM

Date: 03/05/1992 Event No.: 011504 Type Incid: CHEMICAL Shft: BLUE

Facl: FD4 AC/Equip : VehId:

Tail# Tag#: Decal No:

Sit CHEM SPILL,CREEK,CLASS 3 Chemical/Fuel: HEAVY SEWER SLUDGE

Loc: BEHIND WATER & WASTE

Noti'f By: BAXTER Organ: DE Phone: 43114

Equip ENG3,SQD1,HIT1,CH2 ,RMP3,

Time of Call: 09:48:09.20 Time Out: 09:48 Disp Time: 0 Min 29 Sec
Time On Scene 09:52 Response Time: 4 Min
Time In Svc: 17:17 Time On Scene: 7 Hr 5.00 Min

Crew Chief HENSLEY Dispatcher: RJF

Sit Found: STANDBY HAZ CONDITION; EMERGENCY (CHEM SPILL, RADIAT LEAK

Spill Cls: 3 Spill Amt: 1,000 Injuries?: Barrier: N

Action Taken: Chem Log Activated: N

Type Agent: SAND Agent Used: 75

Organization: DE Rep: JOE GUARD Dy Ph: 4-3114

Ground Crew Forward: 0 Aft: 0 Other Ground Crew/Pass: 0

Total Ground Crew/Pass: 0

CREW CHIEF SUMMARY

VALVE AT FINAL MIXING TANK FAILED ALLOWING APPROX 1000 GAL OF HEAVY SEWER TREATED SLUDGE TO ENTER SOLDIER CREEK AT IWTP PLANT. CREEK BLOCKED AT CULVERT GOING UNDER I-40 WITH SAND FROM ROADS AND GROUNDS. E.M. AND HIT 1 TO MONITOR USPCI RECOVERY OF PRODUCT AND ESCOURT NEWS MEDIA INTO PUMPING AREA. USPCI VACUUMING CREEK AT IWTP PLANT ALSO. ENG 3 BLOCKED "PRICES POND" REDUCING CREEK FLOW DURING DIKING OPERATON. ALL SPILL AGENCIES ON SITE. DAN LUTON AND CHIEF 2 UPDATED GEN. SPIRES. HIT 1 AND E.M. MONITORING CLEAN UP AND ALSO PROVIDING ESCOURT FOR NEWS MEDIA IF REQUIRED. JOE GUARD REPORTED NEW VALVE FAILED THAT TIES INTO NEW SYSTEM BEING INSTALLED.

Reviewed By: HENSLEY Senior Officer: HENSLEY

FIRE PROTECTION BRANCH
Emergency Dispatch Log

Generated March 6, 1992 at 8:23 AM

DATE	ID#	TIME	LOG ENTRY
03/05/92	011504	09:48	** DISPATCH STARTED **
03/05/92	011504	:	ENG3,SQD1,HIT1,CH2 ,RMP3,
03/05/92	011504	:	INCIDENT: CHEM SPILL,CREEK,CLASS 3
03/05/92	011504	:	LOCATION: BEHIND WATER & WASTE
03/05/92	011504	:	FD4
03/05/92	011504	:	
03/05/92	011504	:	NOTIF:BAXTER :43114
03/05/92	011504	09:52	UNITS ARE 10-14 AT THIS TIME
03/05/92	011504	09:49	ADVISED CH2 OF WINDS 180 @ 18
03/05/92	011504	09:49	CHEMICAL CHECKLIST ACTIVATED
03/05/92	011504	09:57	ADVISED CH2 THAT ROADS AND GROUNDS ARE
03/05/92	011504	:	RESPONDING WITH SAND
03/05/92	011504	09:58	CH2 REPORTS THAT WATER & WASTE PERSONNEL
03/05/92	011504	:	REPORT THAT A VALVE MALFUNCTIONED, SPILL
03/05/92	011504	:	IS ISOLATED FROM CONTINUING AND THERE IS
03/05/92	011504	:	RESIDUE IN CREEK, THERE IS NO LONGER A
03/05/92	011504	:	30 MINUTE FLOW
03/05/92	011504	10:01	CH2 REPORTS TO CALL WORK ORDER FOR 2-3
03/05/92	011504	:	LOADS OF SAND
03/05/92	011504	10:03	CH2 ADVISES THAT SAND TRUCKS NEED TO
03/05/92	011504	:	STAGE AT ENTRANCE AT WATER & WASTE
03/05/92	011504	10:04	CH2 ADVISES THAT A BACKHOE OR FRONT END
03/05/92	011504	:	LOADER IS NEEDED

FIRE PROTECTION BRANCH
Emergency Dispatch Log

DATE	ID#	TIME	LOG ENTRY
03/05/92	011504	10:06	CH2 TO HQ, UPDATE FIRE CHIEF
03/05/92	011504	10:07	HQ CALLED CELLULAR PHONE AND LEFT MSG.
03/05/92	011504	10:07	SP WANTS TO KNOW IF TRAFFIC CONTROL IS
03/05/92	011504	:	NEEDED
03/05/92	011504	10:07	CH2 ADVISES NEGATIVE
03/05/92	011504	10:08	SQD1 REPORTS SPILL SPOTTED ON WEST SIDE
03/05/92	011504	10:08	SAND TRUCK RESPONDING
03/05/92	011504	10:10	CH2 ADVISES EM 10-14
03/05/92	011504	10:12	ADVISED CH2 OF FIRE CHIEF UPDATED
03/05/92	011504	10:17	CH2 TO HQ, NEED UPDATE ON 2ND LOAD OF
03/05/92	011504	:	SAND
03/05/92	011504	10:17	HIT 1 TO CH2, THE 2ND TRUCK OF SAND IS
03/05/92	011504	:	COMING UP INDUSTRIAL BLVD
03/05/92	011504	10:20	CH2 REPORTS SAFETY ON SCENE
03/05/92	011504	10:21	CH2 REPORTS USPCI BACKING IN AT THIS
03/05/92	011504	:	TIME
03/05/92	011504	10:23	CH2 REPORTS THE PRODUCT IN CREEK HAS
03/05/92	011504	:	BEEN TOTALLY TREATED
03/05/92	011504	10:30	CH2 REPORTS THE DIKE WILL BE FINISHED IN
03/05/92	011504	:	APRX 10 MIN, IT IS LOCATED ON THE SOUTH
03/05/92	011504	:	SIDE OF THE INTERSTATE BY THE DIRT ACC-
03/05/92	011504	:	ESS RD. THE SPILL WILL NOT GET FURTHER
03/05/92	011504	:	THAN THAT
03/05/92	011504	10:33	RMP 1 IS DISPATCHED TO GET THE SAND

FIRE PROTECTION BRANCH
Emergency Dispatch Log

DATE	ID#	TIME	LOG ENTRY
03/05/92	011504	:	TRAILER AND REPORT TO THE SCENE
03/05/92	011504	10:35	CH2 REPORTS THEY WILL DUMP THE SAND AT
03/05/92	011504	:	POND TO KEEP THE SPILL FROM GOING ANY
03/05/92	011504	:	FURTHER
03/05/92	011504	10:36	RMP 1 RESPONDING
03/05/92	011504	10:42	RMP 1 10-14
03/05/92	011504	10:42	CH2 REQUEST ANOTHER FRONT END LOADER BE
03/05/92	011504	:	SENT TO THE BRIDGE ON DOUGLAS
03/05/92	011504	10:46	CH2 REQUEST SP BE SENT TO CONTROL TRAFF-
03/05/92	011504	:	IC
03/05/92	011504	10:47	EN 3 HAS THE DIKE COMPLETED AND THE WAT-
03/05/92	011504	:	ER FLOW FROM PRICE POND STOPPED
03/05/92	011504	13:26	HIT 1 REPORTS THEY HAVE PUMPED APPRO.
03/05/92	011504	:	20,000 GALLONS AND THE CREEK HAS CLEARED
03/05/92	011504	:	UP, THEY WILL TAKE 1 MORE SAMPLE
03/05/92	011504	14:10	HIT 1 REPORTS HE NEEDS TO GET ROADS AND
03/05/92	011504	:	GROUNDS TO I-40 UNDER CREEK WITH 3 LOADS
03/05/92	011504	:	OF SAND AND A FRONT END LOADER
03/05/92	011504	14:29	UTILITIES CONTROL REPORTS THE SAND AND
03/05/92	011504	:	FRONT END LOADER ARE ENROUTE
03/05/92	011504	14:40	HIT 1 REPORTS ROADS AND GROUNDS 10-14
03/05/92	011504	17:02	HIT 1 REPORTS USPCI STILL PUMPING,EM
03/05/92	011504	:	STILL ON SCENE,HIT 1 10-19
03/05/92	011504	17:17	*** RUN TERMINATED ***

FIRE PROTECTION BRANCH
Emergency Dispatch Log

DATE	ID#	TIME	LOG ENTRY

--- End of Report ---

MSG HSB117

IMMEDIATE

1 week C8.

DATE: 065
TIME: 2013

ALC/FMPOC
OC-ALC/CC
CV
EM
PA
FMPB
2854ABG/CC

OAAUZYUW RUVOARA4720 0652012-UUUU--RUVOAFA.
ZNR UUUUU
O 051900Z MAR 92
FM OC ALC TINKER AFB OK//FMPOC//
TO AIG 9425
ACCT AF ACXJRF
BT
~~UNCLAS~~ JOPREP JIFFY//
MSGID/OPREP-3H/OC-ALC/005/MAR//
REF/A/VMG/OC-ALC, FMPOC/051355MAR92/005//
AMPN/REF A IS A OPREP-3 HOMELINE VOICE REPORT//
FLAGWORD/HOMELINE/-//
TIMELOC/051355Z/TINKER AFB OK//
GENTEXT/AT APPROXIMATELY 051355Z MARCH 1992 AN EMPLOYEE AT THE BASE INDUSTRIAL WASTE PLANT DISCOVERED INDUSTRIAL SLUDGE POURING FROM A BROKEN VALVE. THE BASE FIRE DEPARTMENT RESPONDED AND DISCOVERED THE SLUDGE WAS FLOWING INTO SOLDIER CREEK. THE CREEK WAS DAMMED APPROXIMATELY 200 YARDS PAST THE BASE PERIMETER FENCE. IT IS ESTIMATED THAT LESS THAN 500 GALLONS ESCAPED INTO THE CREEK. NO ENVIRONMENTAL OR ADVERSE HEALTH CONDITIONS ARE EXPECTED. LOCAL MEDIA INTEREST WAS MINIMAL. FURTHER REPORTING WILL BE THROUGH ENVIRONMENTAL CHANNELS. RULE 14 APPLIES. THIS IS A FINAL REPORT.
BT
#4720
NNNN

13/

APPROXIMATE DATE OF RELEASE: Aug 5, 1992, 8:41 a.m.

MATERIAL RELEASED: JP-4 Jet Fuel

AMOUNT RELEASED: 150 gallons of JP-4 were released when torrential rains allowed an oil water separator to overfill a fuel slop tank with water, pushing fuel through a vent pipe from tank.

LOCATION OF RELEASE: The release occurred at the slop tank located on the north side of the Bldg 486 fuel farm pump station at the NE 1/4 of the SW 1/4 of section 15, Township North, Range 2 West.

RESPONSE ACTIONS: The base waste haul contractor responded and pumped up fuel from the area. Absorbent pads and booms were used to absorb residual fuel and to block the flow to nearby Kuhlman Creek. Booms were placed in the creek and a small amount of fuel was also pumped from the creek.

OFFICIAL RELEASE REPORT

TAFB ENVIRONMENTAL MANAGEMENT DIRECTORATE

JP-4 RELEASE TO KUHLMAN CREEK

1. Name of Installation: Tinker AFB, OK

2. Incident Report Number: Initial / Final

3. Date/Time of Incident: 05 Aug 92 / 0841 Hrs

4. Severity of Incident: Minor, no damage to fish or wildlife. Released fuel contained on the installation and recovered.

5. Location of Spill: The NE 1/4 of the SW 1/4 of Section 15, Township 11 North, Range 2 West. Spill was from the slop tank associated with the oil/water separator for the 486 Fuel Farm.

6. Cause of Incident: Torrential rainfall at the Tinker installation, resulting in a total of 3.27 inches in a two day period, caused the oil water separator to overload. The high level in the separator caused the pumps which normally pump fuel from the separator to the slop tank, to pump fuel and water to the tank, causing it to overflow through the slop tank vent pipe.

7. Type and Amount of Pollutant: Approximately 150 gallons / JP-4 Jet Fuel

8. Damage Impact to Surroundings: Soil Contamination, due to this release, is not expected. Rainwater which had accumulated in the area allowed the fuel to float from the spill site to the creek, minimizing the amount which might normally soak into the soil.

9. Corrective Action to Eliminate Source: The tank had stopped overflowing prior to the discovery of the release.

10. Corrective Action to Remove Pollutant: Fire Department and Environmental Management personnel responded and used sand and absorbent booms to contain the fuel in the creek and at the fuel yard. The base waste transportation contractor responded and used 2 vacuum trucks to pump the spilled fuel and water from the spill site and then skimmed the fuel from the creek where it had collected beside the absorbent/containment booms in Kuhlman Creek.

11. Assistance Required: Tinker Fire Department, Environmental Management, Public Affairs, Legal, Base Waste Transportation Contractor, Ground Safety, Bioenvironmental Engineering.

12. Estimated Date of Remedial Action Completion: 15 Aug 92

13. Anticipated News Reaction: Public Affairs was notified immediately, however no media inquiries were received by base personnel.

14. Notifications:
Oklahoma Water Resources Board, 05 Aug 92 at 1045 hrs
Oklahoma Corporation Commission, 05 Aug 92 at 1120 hrs
National Response Center, 05 Aug 92 at 1145 hrs, #130467
HQ AFMC/CEV, 05 Aug 92 at 1150 hrs via telephone. ~~Unable to report via WIMS-ES due to module being removed from the Tinker system.~~

15. Spill Plan Implementation: Base Fuels personnel contacted the Tinker Fire Department upon discovery of the incident.

16. Corrective Action: As a result of this release, Base Fuels has developed an Operational Instruction (OI) requiring that storage tanks associated with oil/water separators be pumped when they have reached 50% capacity, as opposed to pumping at 80% in the past.

Judy Ramsey

JUDY RAMSEY, EMCS
Environmental Protection Specialist

OC-ALC/JAV

OC-ALC/EMCO

ROBERT L. REED, Chief
Environmental Compliance Division

OC-ALC/EMCS

ALLEN K. LAWRENCE
Director, Environmental Management

TAFB ENVIRONMENTAL MANAGEMENT DIRECTORATE

FUEL/CHEMICAL SPILL SUMMARY

JP-4 RELEASE AT THE BLDG 483 FUEL YARD

1. On 05 Aug 92 at 0841, approximately 150 gallons of JP-4 were released to the ground and Kuhlman Creek at Bldg 483 fuel yard east of the base commissary.

2. The release occurred when torrential rains caused the oil/water separator at the facility to become overloaded. The increased flow caused the pumps, which normally transfer fuel from the oil/water separator to a storage tank, to pump fuel and water into the tank which was already filled to approximately 80% capacity.

3. Fire Department personnel responded and placed 20 absorbent/containment booms into the creek. The base waste transportation contractor responded and pumped the spilled fuel from the ground around the fuel yard pump pad and from the creek. The released fuel did not migrate from the installation boundaries.

4. As a result of this release, Base Fuels has developed an Operational Instruction (OI) requiring that storage tanks associated with oil/water separators be pumped when it has reached 50% capacity, as opposed to pumping at 80% in the past.

PART B

NATURE AND EXTENT OF CONTAMINATION

TABLE OF CONTENTS

LIST OF FIGURES

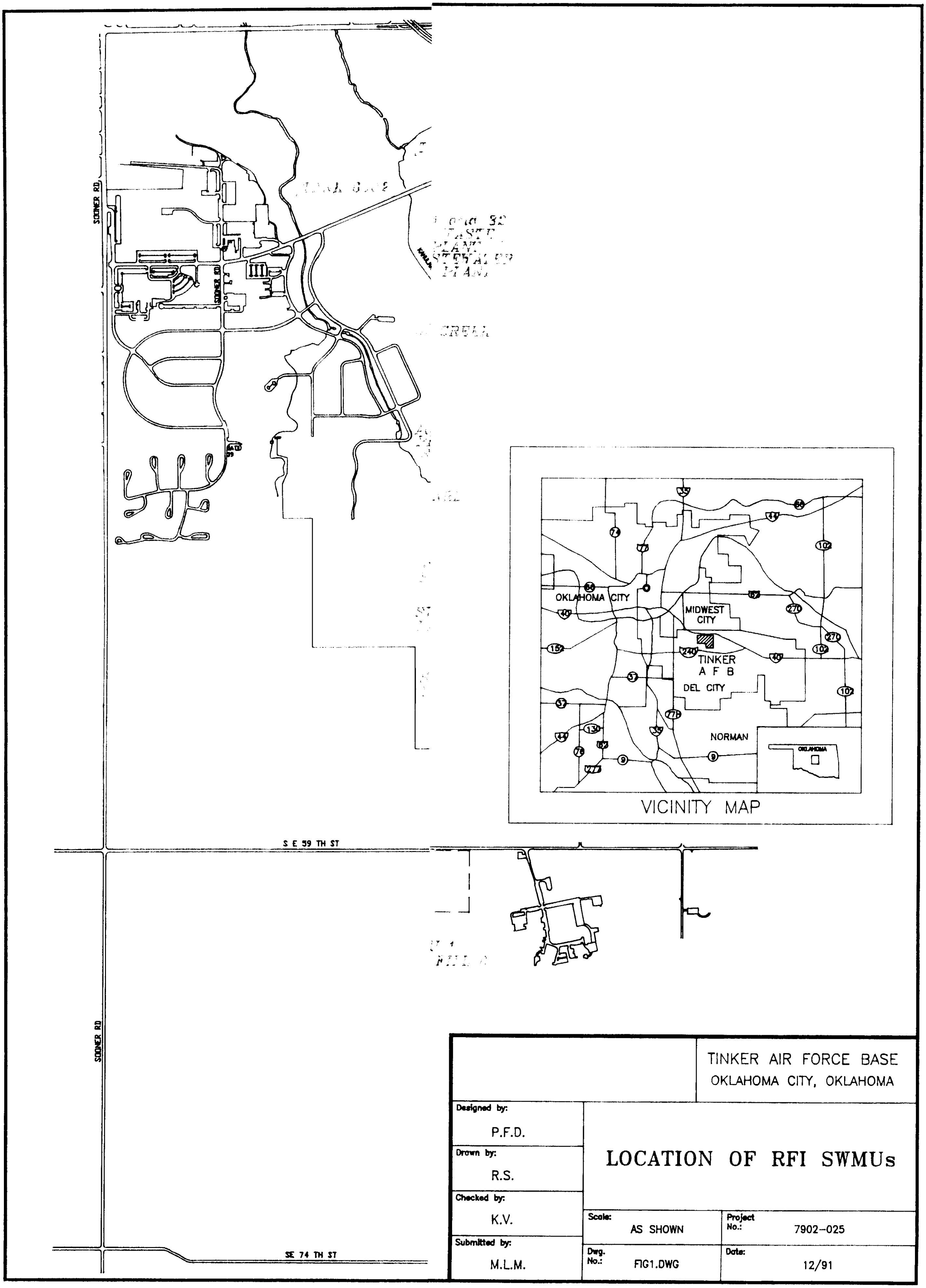
LIST OF TABLES

1.0 INTRODUCTION

Tinker Air Force Base is required by their RCRA Permit, Section VI, Task I, Part B, to describe the nature and extent of contamination for each known source. The following is submitted to meet this request.

2.0 SUMMARY OF SOURCE AREAS OF CONTAMINATION

This section summarizes each source of contamination to include the location, quantities and types of wastes, areas where additional information is necessary; and a description of the existing degree and extent of contamination to include monitoring data and qualitative information on locations and levels of contamination at the facility, all potential migration pathways, and potential impacts on human health and the environment. Figure 1 shows the location of all sites.



TINKER AIR FORCE BASE
OKLAHOMA CITY, OKLAHOMA

LOCATION OF RFI SWMUs

Designed by: P.F.D.			
Drawn by: R.S.			
Checked by: K.V.	Scale: AS SHOWN	Project No.: 7902-025	
Submitted by: M.L.M.	Dwg. No.: FIG1.DWG	Date: 12/91	

RI, samples of the solid waste in the trenches was obtained. Tables 1 and 2 list the contaminants found and their maximum concentrations.

Water is present in the buried trenches of the landfill. This water has become concentrated leachate and was sampled during the 1990 RI. Table 3 contains the contaminants found and their maximum levels.

It is estimated that at least 750,000 gallons of leachate is currently present at the site.

A perched aquifer is present at the site. This aquifer was sampled as part of the 1990 RI. The majority of the contamination in the perched zone was found in the western part of the landfill. The primary metal contaminants are arsenic, barium, and cadmium, with barium having the highest frequency of occurrence and concentration. The high concentrations of barium may be naturally occurring and caused by migration of groundwater through the sandstone stratum which leaches barium sulphate. Table 4 contains the contaminants found and their maximum concentrations.

The top of regional aquifer was sampled during the 1990 RI. High levels of barium were detected again. As stated above, the high levels could be caused by migration of groundwater through sandstone stratum containing barium sulphate. Table 5 contains contaminants found and their maximum concentrations.

A large lake known as Stanley Draper lake is located approximately 7 miles to the south of LF6. Tributaries to Stanley Draper Lake are located to the west and south of LF6 which intercept runoff and drain to the lake. Sediment samples were analyzed as part of the 1990 RI. The stream sediment samples have shown the presence of some metals in concentrations above background levels. Barium was detected in sediment samples above background levels. However, the concentrations are not considered significant since the values are not much greater than the average background concentrations. Arsenic was also found in concentrations slightly above background concentrations. Table 6 contains the compounds found and their maximum concentrations.

Tinker AFB sits atop a major aquifer known as the Garber-Wellington Formation. Groundwater exists in the Garber-Wellington under both water table and confining conditions, depending on the presence of overlying shale beds, and flows to the southwest. Recharge of the aquifer occurs from precipitation, infiltration, and streams which occur in its outcrop area. Tinker AFB is included in the recharge area for the Garber-Wellington. There are over 20 water supply wells located on TAFB that draw water from this aquifer. The wells provide 4 to 6 million gallons of water pe day for use by the Base, making the Base the largest user of groundwater in the area. These wells average about 217 gallons per minute and consist of multiple screens from a depth of about 200 feet Below Ground Surface (BGS). Tests on the aquifer yielded permeabilities in the range of 10^{-3} cm/s.

Interbedded sandstone, siltstone, and shale of the Hennessey Shale Group and the Garber-Wellington Formation underlie LF6. Two distinct water bearing zones have been identified at the site. The upper water bearing zone, the perched zone, is encountered between 11 feet BGS and 48 feet BGS. The perched groundwater flows in a west to northwest direction of flow at a gradient of approximately 43 feet per mile across the landfill. The hydraulic gradient to the west of the landfill boundary is approximately 25 feet per mile. The groundwater velocity in the perched zone is approximately 47 feet/year. The lower water bearing zone, referred to as the top of regional zone, is encountered between 68 feet BGS to 100 feet BGS. The zone appears to be an unconfined aquifer with a west to southwest direction of flow at a gradient of 38 feet per mile across the landfill. The average groundwater velocity in the top of regional zone is approximately 76 feet per year.

Land use within 1/2 mile of the site includes TAFB on the west and northwest. The Engineering Installation Center, a part of the Air Force Communications Command, is adjacent to LF6 on the eastern border. The remaining areas to the south and east are primarily agricultural.

Groundwater is the primary route of contamination migration at the landfill. Infiltration of surface water which promotes vertical migration of contaminants from the wastes into the lower groundwater units has been minimized by the placement of the compacted clay cap. The cap has reduced water infiltration by approximately 70%. However, since the perched water flows through the waste trenches, contamination will continue to be spread into lower groundwater zones by this method. Once the leachate reaches the upper groundwater zone, it can migrate away from the site at a velocity of approximately 47 feet per year or to lower groundwater zones. Once contamination reaches the top of regional zone it will move towards TAFB water supply well 24 located approximately 1/4 of a mile to the west of the site. Contaminated groundwater could reach the water supply well in approximately twenty years. Direct contact with the wastes buried at the site is unlikely. However, this pathway may become important in the event of excavation at the site.

A feasibility study is needed to determine the most appropriate actions for remediating the contaminated groundwater beneath the site.

TABLE 1: SOLID WASTE ORGANIC CONTAMINANT LEVELS	
COMPOUND	mg/kg
2-Butanone	6300.0
Ethylbenzene	2500.0
Total Xylenes	170000.0
4-Methyl-2-Pentanone	2700.0
Toluene	9100.0
Methylene Chloride	2900.0
Acetone	36000.0
2-Hexanone	450.0
Trichloroethene	4800.0
Tetrachloroethene	280.0
Chlorobenzene	340.0
Naphthalene	3100.0
Bis(2-Ethyhexyl)phthalate	25000.0

TABLE 2: SOLID WASTE METAL CONTAMINATE LEVELS		
Metal	mg/kg	Background mg/kg
Silver	11.0	0.56
Arsenic	5.1	1.1
Barium	150000.0	220.0
Cadmium	34.0	0.72
Chromium	230.0	23.0

TABLE 2: SOLID WASTE METAL CONTAMINATE LEVELS		
Metal	mg/kg	Background mg/kg
Mercury	0.89	<0.1
Nickel	240.0	21.0
Lead	570.0	15.0
Selenium	0.9	<0.1
Zinc	750.0	25.0

TABLE 3: TRENCHWATER CONTAMINANTS MAXIMUM LEVELS	
Compound	$\mu g/l$
Arsenic	28.0
Barium	8700.0
Cadmium	480.0
Chromium	610.0
Lead	1100.0
Nickel	1800.0
Zinc	66000.0
Methylene chloride	910.0
Acetone	4800.0
1,1-Dichloroethane	37.0
Trans-1,2-Dichloroethene	165.0
2-Butanone	6600.0
1,2-Dichloropropane	21.0
Trichloroethene	13.0
2-Hexanone	4400.0
4-Methyl-2-Pentanone	200.0
Toluene	2600.0

TABLE 3: TRENCHWATER CONTAMINANTS MAXIMUM LEVELS	
Compound	µg/l
Total Xylenes	760.0
Phenol	110.0
2-Methylphenol	270.0
4-Methylphenol	2400.0
Benzoic acid	1211.0
n-Nitrosodipropylamine	190.0

TABLE 4: PERCHED AQUIFER MAXIMUM CONTAMINANT LEVELS	
Compound	µg/l
Arsenic	520.0
Barium	26000.0
Cadmium	51.0
Chromium	72.0
Mercury	0.43
Lead	120.0
Nickel	1100.0
Selenium	3.5
Silver	13.0
Zinc	1200.0
Methylene chloride	120.0
Acetone	250000.0
1,1-Dichloroethane	28.0
Trichloroethene	15.0
Benzene	94.0
Toluene	130.0

TABLE 4: PERCHED AQUIFER MAXIMUM CONTAMINANT LEVELS	
Compound	$\mu g/l$
Ethylbenzene	45.0
Xylene	88.0
1,4-Dichlorobenzene	20.0
Bis(2-Ethylhexyl)phthalate	24000.0
Di-n-Octylphthalate	6.9
Diethylphthalate	20.0

TABLE 5: TOP OF REGIONAL CONTAMINANT LEVELS	
Compound	$\mu g/l$
Arsenic	12.0
Barium	19000.0
Cadmium	15.0
Chromium	590.0
Mercury	0.12
Lead	280.0
Nickel	180.0
Selenium	0.76
Zinc	220.0
Methylene chloride	13.0
Acetone	720.0
Trichloroethene	41.0
Benzene	62.0
Toluene	17.0
1,4-Dichlorobenzene	45.0
Bis(2-Ethylhexyl)phthalate	100.0
Di-n-Octylphthalate	13.0

TABLE 6: STREAM SEDIMENT CONTAMINANT LEVELS	
Compound	$\mu g/kg$
Methylene chloride	12000.0
Acetone	28000.0
Arsenic	2700.0
Barium	330000.0
Cadmium	690.0
Chromium	24000.0
Lead	13000.0
Nickel	12000.0
Selenium	30000.0
Zinc	13000.0

2.2 LANDFILL 5

Tinker Air Force Base (TAFB) is located in the southeast portion of the Oklahoma City metropolitan complex, in Oklahoma County. The Base is bound by Sooner Road to the west, Douglas Boulevard to the east, I-40 to the north, and southeast 74th street to the south. Landfill 5 (LF 5) is located in the southeast portion of TAFB and is bounded by Tower Road on the west, Patrol Road to the south, and Crutcho Creek to the north and east (See Figure 1). The site encompasses an estimated 6 acres. LF 5 was in operation from 1968 to 1970 and contains approximately 75,000 cubic yards of waste. Waste disposed of in the landfill consisted of general refuse with small quantities of industrial waste. The waste was disposed of in trenches that ran from the northeast to the southwest and are estimated to be 400 feet long, 50 feet wide, and 16 feet in depth. An 18 inch compacted clay cap was installed in 1990 to minimize the infiltration of groundwater into the landfill. The permeability of the cap has been established to be 1×10^{-8} cm/s. Samples of the waste were obtained as part of the Remedial Investigation (RI) conducted in 1990. Contaminants found included both metals and organic compounds. Tables 7 and 8 lists the contaminants found and their maximum concentrations.

Water is currently trapped within the trenches of LF5 and as a result has become concentrated leachate. The leachate was sampled in 1990 and the results are presented in Table 9. Amounts listed are maximum concentration levels found.

It is estimated that at least 2 million gallons of leachate are present in the landfill trenches.

Water from the perched aquifer was sampled during the 1990 RI. The results are listed in Table 10. The levels listed are maximum levels found and should not be construed as average levels present in the perched aquifer.

The top of regional aquifer was sampled in 1990 as part of the RI and the results are listed in Table 11. The levels listed in Table 11 are maximum levels found and should not be construed as average levels of contaminants present in the top of regional aquifer.

The extent of the regional aquifer contamination is unknown. Two downgradient monitoring wells were demolished during the construction of the Navy E-6A Tacamo facility and the placement of the cap. No upgradient wells are present in the immediate area. Additional wells will be required to accurately assess the extent of contamination in the perched and top of regional aquifers.

TAFB sits atop a major aquifer known as the Garber-Wellington Formation. Groundwater exists in the Garber-Wellington Formation under both water table and confined conditions, depending upon the presence of overlying shale beds. The Hennessey Formation is also present under TAFB and outcrops over the southern half of the Base, including LF 5. The Hennessey Formation consists of reddish-brown shale with beds of siltstone and silty sandstone. The underlying Garber Sandstone and Wellington Formation are hydrologically interconnected formations which are not easily distinguished from each other. Recharge of the aquifer occurs through precipitation, infiltration and streams that occur throughout the recharge area. TAFB is included in the recharge area of the aquifer. More than 20 water supply wells which are screened in the Garber-Wellington Formation are currently in operation at TAFB. The wells provide 4 to 6 million gallons of water per day for use by TAFB, making the Base the largest user groundwater in the area. The wells average 217 gallons per minute and consist of multiple screens from a depth of 200 feet below ground surface (BGS) to 700 feet BGS. The closest water supply well to the site is WS 28, located approximately 3/4 of a mile to the northeast.

Groundwater at the site is encountered in three zones: leachate trapped in the landfill trounces, which are approximately 12 feet BGS; the perched aquifer, which occurs below the landfill trenches and is approximately 25 feet BGS; and the top of regional aquifer in the Garber-Wellington, which is approximately 75 feet BGS. Water in the perched aquifer flows to the southwest with a gradient of approximately 0.02 feet per foot. The perched aquifer and the leachate are confined or partially confined and the permeability of the perched aquifer varies from 1×10^{-3} cm/s to 4×10^{-4} cm/s. The top of regional aquifer appears to be confined or partially confined and flows to the southwest with an approximate gradient of 0.0015 feet per foot. Tests performed on the regional aquifer revealed that the permeability varies from 2×10^{-3} cm/s to 8×10^{-4} cm/s.

The overburden in the area of Landfill 5 consists of clay and residual weathered shale, 8 to 12 feet thick, with some alluvial deposits in the drainages. The soil consist of soft, low plasticity clays and clayey silts. They are damp to moist, occasionally sandy, and vary in color from red-brown to dark gray-brown. The filled trenches are covered with 1.5 feet to 7.5 feet of local soil. The residual clay soil is a result of weathering of the underlying Hennessey Shale. The bedrock consists of the lower Hennessey Shale overlying the Garber-Wellington Formation. The boundary between the two is normally chosen at the top of the first major sandstone bed. The Hennessey Shale dips to the southwest at the site and varies in thickness from 25 feet on the south edge of the landfill to less then 10 feet on the north end. It is red-brown, blocky clay shale with minor beds of siltstone and very fine grained sandstones. The Hennessey Shale provides a fairly impermeable layer over the Garber-Wellington Formation.

Land use within a 1/2 mile radius of the site include military aircraft hanger facilities, taxiways and runways to the south and east, an airfield control tower to the north, and military supply facilities to the west. No ecologically sensitive areas, housing, or military quarters are located within 1/2 mile of the site. Crutcho Creek borders the landfill to the north and east and is being addressed in a separate study.

Direct, physical contact with the wastes and leachate in the buried trenches is unlikely. However, this pathway may become important if excavation at the site becomes necessary. The Hennessey Shale provides a fairly impermeable layer over the Garber-Wellington Formation and is limiting the vertical migration of the contaminants. Future migration of the contaminants should be minimal due to the recently placed cap over the trenches and the presence of the thick, continuous shale beneath the trenches. The low levels of contaminants within the groundwater are predicted to migrate towards the southwest at an estimated rate of 6 feet per year.

TABLE 7: SOLID WASTE ORGANIC CONTAMINATES

Compound	μg/kg
Methylene Chloride	124.0
Acetone	4500.0
2-Butanone	1100.0
4-Methyl-2-Pentanone	230.0
2-Hexanone	90.0
Toluene	250.0
Ethylbenzene	180.0

TABLE 7: SOLID WASTE ORGANIC CONTAMINATES	
Compound	μg/kg
Xylene	890.0
Phenol	62000.0
4-Methylphenol	16000.0

TABLE 8: SOLID WASTE METALS AND BACKGROUND LEVELS		
Metal	μg/kg	Background μg/kg
Silver	8000.0	560.0
Arsenic	5000.0	1100.0
Barium	460000.0	22000.0
Cadmium	270000.0	720.0
Chromium	350000.0	23000.0
Lead	480000.0	15000.0
Nickel	6300000.0	21000.0
Selenium	910.0	100.0
Zinc	1100000.0	25000.0

TABLE 9: TRENCH WATER CONTAMINANTS	
Compound	μg/l
Cadmium	20.0
Lead	120.0
Acetone	1900.0
2-Butanone	610.0
4-Methyl-2-Pentanone	630.0
Ethylbenzene	340.0

TABLE 9: TRENCH WATER CONTAMINANTS	
Compound	$\mu g/l$
Xylene	860.0
2-Methylphenol	180.0
4-Methylphenol	120.0
Benzoic Acid	260.0

TABLE 10: PERCHED AQUIFER CONTAMINANTS	
Compound	$\mu g/l$
Barium	4900.0
Cadmium	13.0
Chromium	250.0
Lead	210.0
Acetone	870.0
Trans-1,2-Dichloroethene	720.0
Trichloroethene	45.0

TABLE 11: TOP OF REGIONAL AQUIFER CONTAMINANTS	
Compound	$\mu g/l$
Barium	5600.0
Chromium	180.0
Lead	80.0
Acetone	34.0
Trichloroethene	18.0
Bis(2-Ethylhexyl)phthalate	21.0

2.3 LANDFILL 1

In operation from 1942-1945, Landfill 1 is located east of Patrol Road and south of Crutcho Creek covering 2.5 acres (See Figure 1). Approximately 36,300 cubic yards of general refuse and industrial waste was placed in it.

Trench water sampling revealed some low concentrations of volatile and semi-volatile organics and chromium detected at 650 μg/l. The perched aquifer had three VOC's detected frequently: trichloroethylene in 28/65 samples, highest at 3800 μg/l; trans-1,2-dichloroethene in 23/65 samples, highest at 540 μg/l; methylene chloride in 12/65 samples, highest at 52 μg/l. Three metals appeared frequently in the perched zone: chromium in 12/64 samples, highest at 660 μg/l; iron in 14/40 samples, highest at 54000 μg/l; manganese in 25/38 samples, highest at 3300 μg/l. The top of regional aquifer had three VOC's detected frequently: trichloroethylene in 16/69 samples, highest at 300 μg/l; methylene chloride in 22/69 samples, highest at 85 μg/l; acetone in 11/64 samples, highest at 65 μg/l. The metals appearing frequently in the top of regional included: iron in 14/36 samples, highest at 480000 μg/l; and manganese in 13/36 samples, highest at 9800 μg/l. Soil borings taken from 8-15 feet revealed acetone at 1400 μg/l, methylene chloride at 18 μg/l, and all metals tested for, detected at low levels.

The groundwater is divided into three zones: the trench water, perched zone, and the top of regional. The trench water is in direct contact with the waste and generally, has higher concentrations of contaminants. In Landfills 1 & 3, the trench water is hydraulically connected to the perched zone. The perched zone exists under the Landfill 1 & 3 trenches at 10-20 feet. The contamination existing in the perched zone migrated from the trenches. The deepest zone is the top of regional which is the uppermost water bearing sandstone unit layer of the regional Garber-Wellington aquifer. The top of regional is approximately 70′ below the surface of Landfill 1. The low concentrations of contaminants that have migrated into this zone are from the perched zone, traveling through preferential pathways and interfingered sandstone layers. The groundwater in the top of regional is flowing southwest at approximately 15 feet/year.

The impact on human health will be evaluated in the Risk Assessment scheduled for FY 93. Potential health risks to be considered would include the location of water supply wells in the area, land use, and the possible contamination of Crutcho Creek. The nearest water supply well is located approximately 1/2 mile upgradient of the landfills, with the screened interval starting at depths of 200 feet, presenting minimal opportunity for contamination. The land use in the vicinity of Landfill 1 does not include any ecologically sensitive areas, housing, or military quarters. In addition, the cap on Landfill 1 prevents any direct contact with the refuse. The cap also serves to minimize the possibility of leachate migrating into Crutcho Creek from the landfill. The Crutcho Creek Remedial Investigation did not reveal any indication of contaminant migration into the creek.

2.4 LANDFILL 2

In operation from 1945-1952, Landfill 2 is south of Landfill Road and adjacent to Landfill 4 on the east, covering 27.5 acres (See Figure 1). The landfill was used primarily for general refuse from the base, including sanitary and industrial. The refuse was placed in trenches running east to west and covered daily with excavated soil with a final layer of 3-4 feet of soil placed on the closed landfill. Approximately 600,000 cubic yards of waste is in Landfill 2. An additional study is needed to characterize the waste in Landfill 2 in order to identify and treat any contaminant "hotspots".

Trench water sampling revealed some low concentrations of volatile and semi-volatile organics to include methyl ethyl ketone at 23000 $\mu g/l$ and trichloroethylene at 380 $\mu g/l$. The metals in the trench water included chromium at 93 $\mu g/l$; iron at

230000 $\mu g/l$; and manganese at 26000 $\mu g/l$. The upper water bearing zone contained the following maximum concentrations: acetone at 714 $\mu g/l$; methylene chloride at 82 $\mu g/l$; trichloroethylene at 65 $\mu g/l$; iron at 780000 $\mu g/l$; manganese at 3300 $\mu g/l$; chromium at 360 $\mu g/l$. The perched aquifer had three VOC's detected frequently: trichloroethylene in 28/65 samples, highest at 3800 $\mu g/l$; trans-1,2-dichloroethene in 23/65 samples, highest at 540 $\mu g/l$; methylene chloride in 12/65 samples, highest at 52 $\mu g/l$. Three metals appeared frequently in the perched zone: chromium in 12/64 samples, highest at 660 $\mu g/l$; iron in 14/40 samples, highest at 54000 $\mu g/l$; manganese in 25/38 samples, highest at 3300 $\mu g/l$. The top of regional aquifer had three VOC's detected frequently: trichloroethylene in 16/69 samples, highest at 300 $\mu g/l$; methylene chloride in 22/69 samples, highest at 85 $\mu g/l$; acetone in 11/64 samples, highest at 65 $\mu g/l$. The metals appearing frequently in the top of regional included: iron in 14/36 samples, highest at 480000 $\mu g/l$; and manganese in 13/36 samples, highest at 9800 $\mu g/l$. Soil borings taken from 7-15 feet revealed acetone at 2600 $\mu g/l$, methylene chloride at 200 $\mu g/l$, methyl ethyl ketone at 1600 $\mu g/l$, chlorobenzene at 270 $\mu g/l$, chromium at 110 $\mu g/l$, lead at 3600 $\mu g/l$.

The groundwater is divided into four zones: the trench water, upper water bearing zone (UWBZ), perched zone, and the top of regional. The trench water is in direct contact with the waste and, generally, is more highly contaminated. The trench water is hydraulically connected to the UWBZ. The UWBZ is a small local groundwater zone that only exists on Landfills 2 and 4. This saturated zone is not thought to be natural but exists due to the presence of the waste trenches, which are more permeable than the clay layer they were constructed in. The perched zone exists under the shale layer that confines the UWBZ and the Landfill 2 & 4 trenches. The deepest zone is the top of regional which is the uppermost water bearing sandstone unit layer of the regional Garber-Wellington aquifer. The groundwater in the top of regional is flowing southwest at approximately 15 feet/year. Due to the confining shale layer beneath the UWBZ, contaminated water in the trenches of Landfills 2 & 4 are not readily migrating vertically into the natural aquifers. The low concentrations of contaminants found in the perched and top of regional is due primarily to the flow through preferential pathways such as fractures.

The potential impact on human health will be evaluated in the Risk Assessment scheduled for FY 93. Potential health risks to be considered would include the location of water supply wells in the area, land use, and the possible contamination of Crutcho Creek. The nearest water supply well is located approximately 1/2 mile upgradient of the landfills, with the screened interval starting at depths of 200 feet, presenting minimal opportunity for contamination. The land use in the vicinity of Landfill 2 does not include any ecologically sensitive areas, housing, or military quarters. Although not capped, a 3-4 foot layer of soil was placed over the refuse after it was closed, preventing any direct contact with the refuse. The possibility of leachate migrating into Crutcho Creek from the landfill exists, although the creek is not a drinking water source. The Crutcho Creek Remedial Investigation did not reveal any indication of contaminant migration into the creek.

2.5 LANDFILL 3

In operation from 1952-1961, Landfill 3 is north of Landfill Road and south of Crutcho Creek, covering 8 acres (See Figure 1). The landfill was used primarily for general refuse from the base, but included some industrial waste. Approximately 180,000 cubic yards of waste is in Landfill 3.

Trench water sampling revealed some low concentrations of volatile and semi-volatile organics to include methyl ethyl ketone at 180000 $\mu g/l$; trichloroethylene at 120000 $\mu g/l$; toluene at 120 $\mu g/l$. The metals in the trench water included chromium at 1600 $\mu g/l$; iron at 120000 $\mu g/l$; and manganese at 4700 $\mu g/l$. The perched aquifer had three VOC's detected frequently:

trichloroethylene in 28/65 samples, highest at 3800 μg/l; trans-1,2-dichloroethene in 23/65 samples, highest at 540 μg/l; methylene chloride in 12/65 samples, highest at 52 μg/l. Three metals appeared frequently in the perched zone: chromium in 12/64 samples, highest at 660 μg/l; iron in 14/40 samples, highest at 54000 μg/l; manganese in 25/38 samples, highest at 3300 μg/l. The top of regional aquifer had three VOC's detected frequently: trichloroethylene in 16/69 samples, highest at 300 μg/l; methylene chloride in 22/69 samples, highest at 85 μg/l; acetone in 11/64 samples, highest at 65 μg/l. The metals appearing frequently in the top of regional included: iron in 14/36 samples, highest at 480000 μg/l; and manganese in 13/36 samples, highest at 9800 μg/l. Soil borings taken from 3-18 feet revealed high concentrations of VOC's in the vicinity of the sludge dump. Maximum concentrations included: acetone at 3900 μg/l, methylene chloride at 8300 μg/l, methyl ethyl ketone at 8900 μg/l, chlorobenzene at 3200 μg/l, trichloroethylene at 3000000 μg/l, toluene at 170000 μg/l, chromium at 380 μg/l, and lead at 1100 μg/l.

The groundwater is divided into three zones: the trench water, perched zone, and the top of regional. The trench water is in direct contact with the waste and generally, has higher concentrations of contaminants. In Landfills 1 & 3, the trench water is hydraulically connected to the perched zone. The perched zone exists under the Landfill 1 & 3 trenches at approximately 10 feet. The contamination existing in the perched zone migrated from the trenches. The deepest zone is the top of regional which is the uppermost water bearing sandstone unit layer of the regional Garber-Wellington aquifer. The top of regional is approximately 70′ below the surface of Landfill 1. The low concentrations of contaminants that have migrated into this zone are from the perched zone, traveling through preferential pathways and interfingered sandstone layers. The groundwater in the top of regional is flowing southwest at approximately 15 feet/year.

The potential impact on human health will be evaluated in the Risk Assessment scheduled for FY 93. Potential health risks to be considered would include the location of water supply wells in the area, land use, and the possible contamination of Crutcho Creek. The nearest water supply well is located approximately 1/2 mile upgradient of the landfills, with the screened interval starting at depths of 200 feet, presenting minimal opportunity for contamination. The land use in the vicinity of Landfill 3 does not include any ecologically sensitive areas, housing, or military quarters. In addition, the cap on Landfill 3 prevents any direct contact with the refuse. The cap also serves to minimize the possibility of leachate migrating into Crutcho Creek from the landfill. The Crutcho Creek Remedial

Investigation did not reveal any indication of contaminant migration into the creek.

2.6 LANDFILL 4

Located immediately west of Landfill 2 and south of Landfill Road, Landfill 4 was in operation from 1962-1968, covering 12.4 acres (See Figure 1). The landfill was used primarily for general refuse placed in east/west trenches covered daily with excavated soil. The completed trenches were covered with 3-4 feet of soil. Approximately 320,000 cubic yards of waste is in Landfill 4. An additional study is needed to characterize the waste in Landfill 4 in order to identify and treat any contaminant "hotspots".

Trench water sampling revealed some low concentrations of volatile and semi-volatile organics to include methyl ethyl ketone at 41000 $\mu g/l$, toluene at 1100 $\mu g/l$, and methylene chloride at 640 $\mu g/l$. The metals in the trench water included chromium at 490 $\mu g/l$ and manganese at 37000 $\mu g/l$. The upper water bearing zone contained the following maximum concentrations: acetone at 714 $\mu g/l$; methylene chloride at 82 $\mu g/l$; trichloroethylene at 65 $\mu g/l$; iron at 780000 $\mu g/l$; manganese at 3300 $\mu g/l$; chromium at 360 $\mu g/l$. The perched aquifer had three VOC's detected frequently: trichloroethylene in 28/65 samples, highest at 3800 μg/l; trans-1,2-dichloroethene in 23/65 samples, highest at 540 μg/l; methylene chloride in 12/65 samples, highest at 52 μg/l. Three metals appeared frequently in the perched zone: chromium in 12/64 samples, highest at 660 μg/l; iron in 14/40 samples, highest at 54000 μg/l; manganese in 25/38 samples, highest at 3300 μg/l. The top of regional aquifer had three VOC's detected frequently: trichloroethylene in 16/69 samples, highest at 300 μg/l; methylene chloride in 22/69 samples, highest at 85 μg/l; acetone in 11/64 samples, highest at 65 μg/l. The metals appearing frequently in the top of regional included: iron in 14/36 samples, highest at 480000 μg/l; and manganese in 13/36 samples, highest at 9800 μg/l. Soil borings taken from 5-18 feet revealed acetone at 23000 μg/l, methyl ethyl ketone at 200000 μg/l, and chromium at 640 μg/l.

The groundwater is divided into four zones: the trench water, upper water bearing zone (UWBZ), perched zone, and the top of regional. The trench water is in direct contact with the waste and, generally, is more highly contaminated. The trench water is hydraulically connected to the UWBZ. The UWBZ is a small local groundwater zone that only exists on Landfills 2 and 4. This saturated zone is not thought to be natural but exists due to the presence of the waste trenches, which are more permeable than the clay layer they were constructed in. The perched zone exists under the shale layer that confines the UWBZ and the Landfill 2 & 4 trenches. The deepest zone is the top of regional which is the uppermost water bearing sandstone unit layer of the regional Garber-Wellington aquifer. The groundwater in the top of regional is flowing southwest at approximately 15 feet/year. Due to the confining shale layer beneath the UWBZ, contaminated water in the trenches of Landfills 2 & 4 are not readily migrating vertically into the natural aquifers. The low concentrations of contaminants found in the perched and top of regional is due primarily to the flow through preferential pathways such as fractures.

The potential impact on human health will be evaluated in the Risk Assessment scheduled for FY 93. Potential health risks to be considered would include the location of water supply wells in the area, land use, and the possible contamination of Crutcho Creek. The nearest water supply well is located approximately 1/2 mile upgradient of the landfills, with the screened interval starting at depths of 200 feet, presenting minimal opportunity for contamination. The land use in the vicinity of Landfill 4 does not include any ecologically sensitive areas, housing, or military quarters. Although not capped, a 3-4 foot layer of soil was placed over the refuse after it was closed, preventing any direct contact with the refuse. The possibility of leachate migrating into Crutcho Creek from the landfill exists, although the creek is not a drinking water source. The Crutcho Creek Remedial Investigation did not reveal any indication of contaminant migration into the creek.

2.7 FIRE TRAINING AREA 1

Fire Training Area No. 1 (FTA1) is located on the west side of Tinker AFB (See Figure 1). The site is bounded by Crutcho Creek to the south, Patrol Road to the east, the old municipal sewage treatment plant to the north, and Air Depot Boulevard to the west. The fire training area was a circular-shaped design 125 feet in diameter located approximately 110 feet west of Patrol Road and about 240 feet north of Crutcho Creek. Originally, the area was enclosed within an earthen dike that was subsequently removed. The fire training area was unlined and supported by a gravel bottom. The site was used from 1950 to 1962 as a fire control training area for Tinker AFB fire fighters. Fire-fighting exercises consisted of dousing an old aircraft carcass with flammable liquids, setting the carcass on fire, and then extinguishing the fire. Water and/or a protein-based foam was used to extinguish the flames. After the exercises, the residual liquids were allowed to percolate into the soil. The exact nature and quantity of flammable liquid used is not known. Volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs) and metals were analyzed for in the soil, and groundwater beneath FTA1. Typically, groundwater moves to the southwest across Tinker AFB, however, a local groundwater high in the top of regional an located southeast of FTA1 has complicated the flow in this area. Additional long-term monitoring wells are to be installed in the perched aquifer and top of regional aquifer zones. All monitoring wells existing and to be installed, will be monitored annually to determine contaminant migration and to detect trends.

A total of 143 soil samples were taken from 24 soil borings on site and 3 borings off site. Two volatile organic compounds (VOCs) were widespread in the soil samples. Methylene Chloride was found in 44 of the 45 samples analyzed for VOCs. In 30 of 45 samples, acetone was also detected. Both methylene chloride and acetone were found in laboratory blanks so it is possible that some of the concentrations may be attributed to laboratory contamination. Of 55 samples analyzed for semi-volatile organic compounds (SVOCs), only bis(2-ethylhexyl)phthalate was found in significant quantities. It was found in 47 of the samples. Ten soil samples were analyzed for metals. Five metals (arsenic, barium, cadmium, lead, and selenium) were found at or above background averages in five or more of the soil samples. Table 12 lists those constituents detected with their concentrations found in the soils at FTA1.

VOCs were analyzed for in sixteen perched aquifer groundwater samples, six VOCs were found in the samples. Vinyl chloride was found in four samples and trichloroethene in six samples. Trichloroethene was found upgradient of FTA1 as well as downgradient. Benzene was found in two samples as was 1,2-dichloroethene(total). Trans-1,2-dichloroethene and tetrachloroethene were both found in one sample. Vinyl chloride, benzene, and tetrachloroethene were not detected in any of the soil samples taken from FTA1. SVOCs were tested for in sixteen perched aquifer samples as well. Bis(2-ethylhexyl)phthalate was the only significant semi-volatile detected in the perched groundwater. It was found in six samples both upgradient and downgradient of FTA1. Two perched aquifer samples were analyzed for metals. Three metals (barium, chromium, and lead) were detected in the aquifer. These metals were found above background levels both upgradient and downgradient of FTA1. Table 13 lists the constituents and their concentrations found in the perched aquifer.

Groundwater samples were taken from the top of regional aquifer annually from an existing well from 1988 to 1990. Two VOCs were found at significant levels. Trichloroethene was found in one sample. Methylene chloride was found in all three samples, however it was detected in laboratory blanks and is likely a laboratory contaminant. The only SVOC found in significant concentrations was bis(2-ethylhexyl)phthalate. It was found in all three samples. No metals were detected above MCL's. Table 14 lists the constituents and their concentrations found in the top of regional aquifer.

The area of FTA1 has an underlying layer of clay that has a thickness of between 8 to 12 feet. Clay has a permeability of approximately 10^{-7} cm/sec, ("Standard Handbook for Civil Engineers", Frederick S. Merritt, Second Edition, 1976), which is approximately 0.1032 feet/year. This implies that any contamination that might have been applied to the surface of this area would take at least 77 years to migrate to the underlying aquifers. Therefore any contamination that exists at this site in the perched or top of regional aquifers has in all probability migrated to this area from off site.

Groundwater exists in the Garber-Wellington Formation under both water table and confining conditions depending on the presence of overlying shale. The perched aquifer is not considered to be a drinking water source at Tinker AFB. The perched aquifer is not hydrologically connected to the regional aquifer in the area of FTA1 ("FIRE TRAINING AREA 1 REMEDIAL INVESTIGATION REPORT", Final May 1992). The direction of groundwater flow in the regional aquifer is to the southwest. The average depth to water in the producing zone is approximately 250 feet below ground surface (BGS). Background water quality at Tinker AFB is best in the deeper strata. Chlorides, sulfates, and specific conductance seem to be lowest in the deeper strata, and highest in groundwater under water table conditions. The closest water supply well is approximately 600 feet to the northeast of FTA1. Typically the water supply wells at Tinker AFB consist of multiple screens set from an approximate depth of 250 feet to 700 feet.

The investigations performed at FTA1 have identified that overall minimal contamination exist at the site. The risk assessment has also determined that the risks, both carcinogenic and noncarcinogenic, to the most exposed population are within EPA guidelines.

TABLE 12: SOIL SAMPLES

Constituents	Maximum	Minimum
Methylene chloride (μg/kg)	130	ND
Acetone (μg/kg)	610	ND
Bis(2-Ethylhexyl)phthalate (μg/kg)	11000	ND
Arsenic (mg/kg)	1.9	ND
Barium (mg/kg)	900	ND
Cadmium (mg/kg)	17	ND
Lead (mg/kg)	170	ND
Selenium (mg/kg)	.21	ND

ND = non-detect

TABLE 13: PERCHED GROUNDWATER SAMPLES		
Constituent	Maximum (μg/l)	Minimum (μg/l)
Vinyl Chloride	71	ND
Trichloroethene	32	ND
Benzene	9	ND
Trans-1,2-Dichloroethene	540	ND
1,2-Dichloroethene (total)	150	ND
Tetrachloroethene	8	ND
Bis(2-Ethylhexyl)phthalate	69	ND
Barium	3200	ND
Chromium	110	ND
Lead	98	ND

ND = non-detect

TABLE 14: TOP OF REGIONAL GROUNDWATER SAMPLES			
Constituent	SEP 88	SEP 89	MAY 90
Trichloroethene (μg/l)	14	<5	<5
Methylene chloride (μg/l)	22	15	2
Bis(2-Ethylhexyl)phthalate (μg/l)	30	6	37

2.8 FIRE TRAINING AREA 2

Fire Training Area No. 2 (FTA2) is located in the south-central portion of Tinker AFB (See Figure 1). The site is located northwest of the control tower and north of Crutcho Creek. FTA2 was established as a temporary pit, the pit was unlined and used infrequently between 1962 and 1966. Standard procedure was to first add water to the pit to saturate the soil, thus reducing infiltration. Fuel was then brought in by tank truck, placed on top of the water, ignited, and extinguished using water and a protein based foam. The residue was left in the pit to evaporate and infiltrate prior to the next fire training exercise. Detailed records of site construction, operation, or demolition do not exist, so exact data on composition and quantity of fuel, or frequency of use is not available. According to 2854 ABG/DEE (Tinker AFB, Civil Engineer Squadron), the upper soils of FTA2 were excavated, sampled, and determined to be clean. No records of demolition or other cleanup of FTA2 has been found, it was assumed that the site was simply abandoned. The site now appears as a level grassy area with no visible signs of its past use as a fire training area. During an IRP Response Action performed by the US Army Corps of Engineers, soil beneath FTA2 was analyzed for volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), and total metals. This investigation revealed that more information is needed about background concentrations of metals in the soil in this portion of Tinker AFB.

Three soil borings were made and samples were taken for chemical analysis from the following depths: 0-1 feet, 1-4 feet, 4-7 feet. At approximately 4 feet, a shale layer was encountered. Auger refusal occurred between 5 and 7 feet, terminating the borings and sampling. Methylene chloride was found in 8 of 11 samples and acetone was found in 3 of 11 samples analyzed for VOCs. There was only one SVOC found and that was bis(2-ethylhexyl)phthalate it was present in 4 of 11 samples analyzed. Table 15 the constituents with their range of concentrations. Six metals (barium, cadmium, mercury, nickel, lead, selenium) were found at or above background averages. The concentrations of these metals were compared to average background levels established by analyzing a total of 16 samples from four base perimeter borings. Table 16 lists the metals their maximum, average, and background concentrations.

During drilling operations auger refusal occurred between 5 and 7 feet, approximately 3 feet into the shale of the Hennessey Formation, which is projected to be 20 feet thick from other borings in the vicinity of the site. The clay layer in this area has a thickness of approximately 5 feet, from the ground surface until the shale layer is encountered.

Given that the permeability of clay is approximately 10^{-7} cm/sec, ("Standard Handbook of Civil Engineers," Frederick Merritt, Second Edition, 1976), which is approximately 0.1032 feet/year. Given this low permeability and the fact that the site has an underlying shale bed it is unlikely that any contaminants that might have been applied to the surface could have migrated off site. Although a perched water table is frequently encountered on top of the Hennessey shale, a perched water table was not encountered at this site at the time of exploration. The presence of the low permeability clay and shale underneath the site make a horizontal migration towards Crutcho Creek a likely transport mechanism than percolation to deeper saturated zones.

The investigations performed at FTA2 have identified that no contamination exist at the site therefore, there is no threat to human health or the environment.

TABLE 15: RESULTS OF SOIL SAMPLES (VOCs AND SVOCs)

Constituent	Concentration Range (µg/kg)	Times Detected/# of Samples
Methylene chloride	0 - 160	8/11
Acetone	0 - 30	3/11
Bis(2-Ethylhexyl)phthalate	0 - 2200	4/11

TABLE 16: RESULTS OF SOIL SAMPLES (METALS)

Constituent	Maximum (mg/kg)	Average (mg/kg)	Background (mg/kg)
Barium	400	180	218
Cadmium	0.80	0.61	0.72
Mercury	0.19	0.07	<0.1
Nickel	22	11.7	20.7

TABLE 16: RESULTS OF SOIL SAMPLES (METALS)			
Constituent	Maximum (mg/kg)	Average (mg/kg)	Background (mg/kg)
Lead	15	10.7	15
Selenium	0.20	0.15	<0.1

2.9 SUPERNATANT POND

The Supernatant Pond (SP) is located on the west side of Tinker AFB east of and adjacent to Patrol Road and approximately 200 feet north of the northwest-flowing Crutcho Creek (See Figure 1). The former pond covered an area of approximately 6,400 squared feet. As-built drawings show the SP was connected by a 10 inch in diameter sanitary sewer pipe to the sludge drying beds at a sewage treatment plant located approximately 800 feet northwest of the SP. The SP was used as an impoundment for sewage effluent in the 1950's and 1960's. The sewage treatment plant was in use through the late 1960's. Base personnel continued to use the SP as a disposal site for liquid wastes generated in base operations until 1984. Reportedly, these wastes included petroleum hydrocarbon sludge, solvents, and cyanide contaminated liquids. When the pond was abandoned (1984), soil fill was placed in the SP area. This fill was subject to significant settlement and would not support the growth of vegetation. Subsequently, construction rubble, consisting of asphalt, concrete, wood, etc., was placed followed by a layer of soil fill to maintain grass over the site. Approximately 300 cubic yards of construction material was used as backfill when the SP was removed from use. The exact quantities of liquid or waste disposed of at the SP is not known. Volatile organic compounds (VOC's), semi-volatile organic compounds (SVOC's) and metals were analyzed for in the soils around and in the area of the SP. Typically, groundwater moves to the southwest across Tinker AFB, however a local groundwater high in the top of regional complicates the flow in this area.

The SP was remediated using the innovative technology of stabilization/solidification. This technology effectively locks contamination into a cement matrix. During the remediation at the SP 250 lbs of cement and 40 lbs of flyash were mixed to every 1 cubic yard of soil.

A total of 10 composite samples were taken from the site during remediation. The samples were taken from ground level to a total depth of 8 feet. These 10 composite samples were analyzed by Toxicity Characteristic Leachate Procedure (TCLP) method to characterize the hazardous constituents that might exist in the soil matrix. TCLP results indicated that there were no hazardous constituents in the soil. During the installation of three new monitoring wells (one perched and two top of regional) at the SP, groundwater analysis was performed. The aquifers were analyzed for metals, VOC's, and SVOC,s. Methylene chloride and bis(2-ethylhexyl)phthalate were detected in all the groundwater samples. Both methylene chloride and bis(2-ethylhexyl)phthalate were detected in the laboratory blanks and can be attributed to laboratory contamination. Chromium was found in the top of regional aquifer at the current MCL. Table 17 list the constituents found in the aquifers with their concentrations.

The geology underlying the SP site consist of a clay layer of approximately 15 feet in thickness. This clay layer changes into a silty sand from 15 to 18 feet and then to a sand layer from 18 to 40 feet in thickness. This sand layer then changes back to silty clay from 40 to 45 feet and then to clay from 45 to 57 feet. Generally in this area, the perched water table is located at a depth of approximately 20 feet and the top of regional is 50 - 100 feet below ground surface. The low permeability of the clay underlying the SP make a horizontal migration toward the Crutcho Creek a more likely transport mechanism than vertical migration to the deeper saturated zones.

During remediation of this site no significant contamination was found, therefore there is no threat to human health and the environment. Field activities and detailed analysis have confirmed that no contamination exist at the SP.

TABLE 17: SOIL AND GROUNDWATER (VOCs, SVOCs AND METALS)		
Constituent	Maximum	Minimum
Methylene chloride	15 (μg/L)	ND
Bis(2-Ethylhexyl)phthalate	10 (μg/L)	ND
Chromium	0.05 (mg/L)	ND

ND = non-detect

2.10 INDUSTRIAL WASTE PIT NO.1

Industrial Waste Pit No. 1 is located in the southeast portion of the Base, south of the ramp end and the fuel purge facility (See Figure 1). The Waste Pit was in operation from 1947 to 1958 and was closed and filled with soil in 1958. The Waste Pit received an unknown volume of waste from various industrial processes from around base. These processes included waste oils, stripping solutions, and plating waste. The waste streams were mixed with waste petroleum products and burned in order to reduce volume and volatility. The exact type and quantity of waste streams received and disposed of at the Waste Pit are unknown.

The Remedial Investigation for Industrial Waste Pit No. 1

included the installation of monitoring wells, bore holes, water and soil analyses, performance of a soil vapor survey and an electromagnetic conductivity survey. The soil vapor survey found methane in concentrations from 18.34 to 5623.44 ppm, trichloroethylene from 1.18 to 16.21 ppm, tetrachloroethylene from 0.0 to 1.11 ppm and benzene from 0.0 to 0.18 ppm. Groundwater sampling indicated non detection for Total Petroleum Hydrocarbon (TPH), total cyanides, phenols, and base neutral acid extractables (BNAs or semi-volatile organics). The water samples indicated maximum concentrations of Total Organic Halides (TOX) 0.044 ppm, and Total Organic Carbon (TOC) 16 ppm. All detected metals were well below the Maximum Contaminant Levels (MCLs). The soil sample indicated TPH at 28.4 ppm, total cyanides at 0.59 ppm, and phenols at 3.7 ppm. This data represented sampling from 5 to 30 feet in depth at the site. It is also important to note the extremely high concentrations of methane gas encountered during the soil vapor investigation. This is indicative of effective in situ biodegradation of residual organic compounds.

Potential migration pathways for contaminant movement at the site are relatively nonexistent. The Waste Pit is located within the Hennessey Shale beds which overlay the Garber-Wellington formations on the south portions of the Base. The Hennessey, in that area, characteristically consists of weathered shale or massive clay beds. This clay formation has permeabilities within the ranges of 10^{-12} to 10^{-17} cm/sec. The shale beds are interspersed with silt and sand zones which often trap limited volumes of infiltrating waters. These zones are noncontiguous and are not interconnected. Due to the overlying presence of the clay beds, a perched aquifer does not exist at this site and depth to the regional aquifer (zone of saturation) is in excess of 80 feet. Therefore, contaminant migrations due to infiltrating waters is not applicable to this site. Migrations of contaminants via air and surface runoff are also nonapplicable due to the soil and vegetative cover at the site.

Due to the extremely limited extent of contamination and the physical (hydrogeologic, pedologic, and hydrologic) site conditions, there exist no potential impact to human health or the environment.

2.11 INDUSTRIAL WASTE PIT NUMBER 2

The Industrial Waste Pit No 2 is located on the southeastern portion of TAFB, north and west of Patrol Road and southeast of Runway Drive (See Figure 1). The waste pit was in operation from 1958 to 1965 when it was backfilled with soils and abandoned. Past waste disposal practices included waste oils, cyanides, chromates, phenols, solvents, and waste acids and alkalies which were mixed with waste petroleum products and often burned in order to reduce volume. The exact quantities of solid and hazardous waste disposed at the site are unknown. A Draft Remedial Investigation Report performed by the COE found insignificant contamination at the site and recommended no further action.

Five monitoring wells have been installed to monitor for potential contaminant migration to the groundwater. One perched well was installed to a depth of 8 feet within the waste pit, one perched well was installed to a depth of 30 feet adjacent to the waste pit, and three monitoring wells (two down gradient and one upgradient) were installed to monitor the zone of saturation at a depth in excess of 75 feet. Also, during initial site investigations, numerous soil samples were submitted for analyses. Based on the analytical results from soil and groundwater sampling, no significant contamination has migrated from the site. Sampling within the waste pit (both water and soil) indicated metals contamination above base background levels for manganese and zinc, volatile contamination of 1,2-dichloroethylene of 2 $\mu g/l$, and semi-volatile organics contamination due to chlorobenzene, isomers of dichlorobenzene, and total phenols with concentrations varying from 17 to 370 $\mu g/l$.

Industrial Waste Pit No 2 is located within the Hennessey formation. Underlying formations consist of the Kingman Siltstone and the Fairmont Shale with both formations exhibiting hydraulic conductivity values less than 10^{-12} cm/sec. The waste pit was excavated within the weathered shale of the Hennessey shale and is totally contained within the clay and silty clay soils of this formation. An interconnecting contiguous perched aquifer does not exist at the site and a relatively impermeable shale formation extends to a depth of 33 feet below the waste pit. Therefore, vertical and horizontal contaminant migration by percolating waters are insignificant for this site. Upon abandonment, the pit was filled and graded to drain thus eliminating surface runoff of contaminants and dramatically reducing the potential of vapor phase transfer or volatilization to the atmosphere.

Based upon groundwater sampling and soil sample data from areas contiguous but not within the waste pit, there is no significant potential for adverse impact to the environment or to the health of the public from this site.

2.12 FUEL CONTAMINATED SITE NO. 1

Fuel Contaminated Site No. 1 is an Underground Storage Tank

(UST) which is located in an alcove on the south side of Building 201 (See Figure 1). This UST is no longer in use. Drawings found in Civil Engineering have indicated that this tank was used to hold solvents for a paint shop. The dates of service for this UST are unknown as are the exact contents and size of the tank. Addition information is required to determine the extent of groundwater contamination.
One groundwater monitoring point exists downgradient of the UST. The groundwater contains Toluene at 33 $\mu g/L$, Total Organic Halogen at 1900 $\mu g/L$, Trichloroethylene at 3000 $\mu g/L$, Chlorobenzene at 360 $\mu g/L$ and Vinyl Chloride at 160 $\mu g/L$. Soil analysis from a boring at this site indicated Total Hydrocarbons at 3,880,000 ppb and Trichloroethylene at 200 ppb.

The migration pathway for this site is limited to groundwater. The Perched Aquifer is about nine feet below the surface at this site. The slope of this aquifer at Building 201 has been measured to be 0.0045 foot/foot. The permeability is on the order of 5.0×10^{-4}. Groundwater should flow at a rate of about 7 feet/year. The first ten feet of earth at this location consists of clay. From here it switches to sandstone for another ten feet. Below the sandstone there exists shale, which forms the Perched Aquifer.

Due to the slow movement of groundwater at this site, no immediate danger exists. No surface water is in the area. The area is covered with grass and a pavilion is located about 150 feet to the west of the site. The nearest water supply well is over 3600 feet away. No one works in the immediate vicinity.

2.13 FUEL CONTAMINATED SITE NO. 2

Fuel Contaminated Site No. 2 is an Underground Storage Tank (UST) which is located in an alcove on the west side of Building 201 (See Figure 1). This UST is no longer in use and is believed to have been removed in the early eighties. The date that the tank was put into service is unknown. The exact size is also unknown. The tank was an diesel tank that was used for an emergency generator. Additional information is required to determine the extent of groundwater contamination.
One groundwater monitoring point exists downgradient of the UST. The groundwater contains Benzene at 320 $\mu g/L$, Toluene at 43 $\mu g/L$, Ethylbenzene at 20 $\mu g/L$, Xylenes at 39 $\mu g/L$, and Total Organic Halogen at 287 $\mu g/L$. Soil analysis from a boring at this site indicated Total Hydrocarbons at 190,000.

The migration pathway for this site is limited to groundwater. The Perched Aquifer is about nine feet below the surface at this site. The slope of this aquifer at Building 201 has been measured to be 0.0045 foot/foot. The permeability is on the order of 5.0 x 10^{-4}. Groundwater should flow at a rate of about 7 feet/year. The first ten feet of earth at this location consists of clay. From here it switches to sandstone for another ten feet. Below the sandstone there exists shale, which forms the Perched Aquifer.

Due to the slow movement of groundwater at this site, no immediate danger exists. No surface water is in the area. The area is covered with grass and a depressed area exists in the area where the UST was expected to have existed. The nearest water supply well is over 3600 feet away. No one works in the immediate vicinity.

2.14 FUEL CONTAMINATED SITE NO. 3

Fuel Contaminated Site No. 3 is an Underground Storage Tank (UST) which is located on the north side of Building 201 (See Figure 1). This UST is no longer in use. The dates for service for this tank are unknown. The exact size is unknown. The use of this tank is also unknown. Addition information is required at this site to identify the extent of groundwater contamination.

One groundwater monitoring point exists downgradient of the UST. The groundwater contains Benzene at 3.0 μg/L, Toluene at 15 μg/L, Xylenes at 28 μg/L, Total Organic Halogen at 3730 μg/L and Trichloroethene at 1400 μg/L. Soil analysis from a boring at this site indicated Total Hydrocarbons at 5200 ppb.

The migration pathway for this site is limited to groundwater. The Perched Aquifer is about nine feet below the surface at this site. The slope of this aquifer at Building 201 has been measured to be 0.0045 foot/foot. The permeability is on the order of 5.0×10^{-4}. Groundwater should flow at a rate of about 7 feet/year. The first ten feet of earth at this location consists of clay. From here it switches to sandstone for another ten feet. Below the sandstone there exists shale, which forms the Perched Aquifer.

Due to the slow movement of groundwater at this site and the low levels of contaminants no danger exists. No surface water is in the area. The UST is under a concrete pad and it is located within a fenced are. The nearest water supply well is over 3600 feet away. No one works in the immediate vicinity.

2.15 FUEL CONTAMINATED SITE NO. 4

Fuel Contaminated Site No. 4 is an Underground Storage Tank (UST) which is located on the southwest side of Building 214 (See Figure 1). This UST is no longer in use. The dates for service for this tank are unknown. The exact size is unknown. The use of this tank is also unknown, but is thought to have been a waste fuels tank. Addition information is required to determine the extent of groundwater contamination.

Three groundwater monitoring points exists downgradient of the UST. The groundwater contains Benzene at 4100 $\mu g/L$, Toluene at 6800 $\mu g/L$, Ethylbenzene at 900 $\mu g/L$, Xylenes at 4900 $\mu g/L$, Total Organic Halogen at 9150 $\mu g/L$ and Trichloroethene at 140 $\mu g/L$. Soil analysis from borings at this site indicated Toluene at 9100 $\mu g/L$, Ethylbenzene at 6300 $\mu g/L$, Xylenes at 29,000 $\mu g/L$ and Total Hydrocarbons at 1,114,000 ppb.

The migration pathway for this site is limited to groundwater. The Perched Aquifer is about nine feet below the surface at this site. The slope of this aquifer at Building 214 has been measured to be 0.0185 foot/foot. The permeability is on the order of 5.0×10^{-4}. Groundwater should flow at a rate of about 28 feet/year. The first ten feet of earth at this location consists of clay. From here it switches to sandstone for another ten feet. Below the sandstone there exists shale, which forms the Perched Aquifer.

Due to the slow movement of groundwater at this site no immediate danger exists. No surface water is in the area. The UST is thought to be under a sidewalk area. The nearest water supply well is located over 4000 feet away. No one works in the area.

2.16 RADIOLOGICAL WASTE DISPOSAL SITE 1030W

Radioactive Waste Disposal Site 1030W is located on Landfill 2, on the south end of base, approximately 1800 feet north-west of Building 1030W (See Figure 1). There is approximately 1,000 cubic yards of soil that contains above 15 picocurie per gram of radium-226. Approximately 690 cubic yards of soil have been excavated from the site. The contamination is contained within an area approximately 150 foot by 250 foot and is thought to be within the top 20 feet of the soil. Excavation of the site is not complete and the depth to which the contamination extends is not fully known. The final survey after excavation is completed should fill in any data gaps concerning the size of the area that may contain radiologic contamination.

Extensive radium-226 contamination has been found at this site from surface to a depth of approximately 14 feet. The soil in the area of contamination is loose dirt mixed with trash from the landfill. There is some water that has collected in the landfill trenches that was encountered during excavation. Results of the surveys done on the site can be found in Installation Restoration Program Phase I - Records Search, Tinker AFB, Oklahoma, Radiological Waste Disposal Sites, Tinker Air Force Base, Oklahoma City, Oklahoma, Investigation of the Tinker AFB Radioactive Waste Disposal Sites, Phase II, Final Report, Volume I, and Work Plan for Oklahoma City Air Logistics Command (Tinker Air Force Base) for the Radioactive Waste Disposal Site (RWDS) 1030W.

When the excavation at the site is complete the soil pathway will have been eliminated. At the site, west-dipping sand and shale beds of the Garber-Wellington and Hennessey Formations are overlain by 10 to 30 feet of clay and silt. The geohydrology is complicated by the primarily east-west trenches which comprise the landfill, but groundwater flow (May, 1990 data) appears to be generally south-southwest in both the perched and Top of Regional aquifers. The site is located on top of Landfill 2 which is scheduled for a RCRA cap. With the cap in place the air pathway for the site will be eliminated and the water transport of any contamination will be greatly reduced.

The site is located on top of Landfill 2 which is scheduled for a RCRA cap. The surrounding area has a very low population and is adjacent to two other landfills. The nearest water supply well is approximately 1 mile north of the site and extracts water from the Garber-Wellington at depths greater than 200 feet.

2.17 RADIOLOGICAL WASTE DUMP SITE 201S

Radioactive Waste Disposal Site 201S is located in the southern alcove of Building 201 near the center of base (See Figure 1). There is approximately 45 cubic yards of soil that contains above 5 pCi/g of radium-226 within 15 centimeters of the surface or above 15 pCi/g of radium-226 below 15 centimeters of the surface. The contamination is contained within an area 50 foot by 50 foot and is within the top 2 feet of the soil. The Risk Assessment included an intrusive survey which identified all areas of contamination.

During the Risk Assessment for this site approximately 30 soil samples from the surface to a depth of 12 feet have been taken. Near the surface, concentrations of radium-226 range from non-detectable to 109.3 picocuries per gram. At depths greater than 10 feet the concentrations of radium-226 fall below detection limits. Results of the Risk Assessment have not been finalized.

Presently the radium-226 is confined to the top 1 to 2 foot of soil. The area is covered with vegetation so that the air pathway is a very low risk. The perched aquifer is approximately 10 foot below the contamination and flows to the west-southwest with a gradient of 0.0045 foot per foot. The ground between the contamination and perched aquifer is clay which has retarded any migration of the radium into the aquifer.

The site is located next to Building 201 which is presently being used by the Bioengineering, Training, and other offices which employ approximately 200 people. The site is approximately 100 feet east of a pavilion where employees can eat outside. The area is not fenced off but does have a concrete marker at the center of the site. The nearest water supply well is approximately 1 mile west of the site and extracts water from the Garber-Wellington at depths greater than 200 feet.

2.18 RADIOLOGICAL WASTE DISPOSAL SITE 62598

Radioactive Waste Dump Site 62598 is located north of Crutcho Creek, south of Facility, west of Reserve Road, in the vicinity of Landfill 3, on the south end of base (See Figure 1). No radiologic contamination has been found at this site. No waste was found at the site. After extensive excavation at this site, a final survey was conducted which indicated that there is no contamination. It is recommended that no further action be conducted at this site. No additional information required.

Confirmatory survey of the site by Armstrong Laboratory found no radiologic contamination. Three samples were taken during excavation at depths of one, two and three feet. None of the samples had above 2.5 picocuries per gram radium-226. Results of the survey can be found in CDM Federal Programs Corporation, "Closure Report RWDS 1022E & 62598 Tinker Air Force Base", January 1992.

Because no radiologically contaminated objects or soil were discovered at this site, the soil, water and air migration pathways at this site have been eliminated.

No soil or air pathways exist at this site. The nearest water supply well is approximately 1200 feet north of the site.

2.19 RADIOLOGICAL WASTE DUMP SITE 1022E

Radioactive Waste Dump Site 1022E is located northwest of Landfill 3 , on the south end of base (See Figure 1). Three (3) objects have been removed from the site: thorium-230 object (291g, activity 2.1 nanocuries per gram), thorium-230 object (119g, activity 1.7 nCi/g) and radium-226 compass (70g, activity 544 picocuries per gram). All radiological material has been removed. No mixed waste was found at the site. However, 5.1 cubic meters of chemically contaminated soils were excavated and disposed of properly. After removal of the radiological contamination at this site, a final survey was conducted which indicated that there is no further contamination. It is recommended that no further action be conducted at this site. No additional information required.

The initial survey of the site before excavation indicated only two discrete points above 7.0 microrem/hour which is the background radiation level for the area. The two points were 10.6 and 14.2 microrem/hour. Samples were taken during the excavation to a depth of 12 feet. No soil samples taken during or after the excavation had more than 4.6 picocuries per gram radium-226. Confirmatory survey of the site by Armstrong Laboratory found no more radiologic contamination. Results of the survey can be found in CDM Federal Programs Corporation, "Closure Report RWDS 1022E & 62598 Tinker Air Force Base", January 1992. There is one up gradient well and one down gradient well which will be sampled annually.

Due to the removal of all radiologically contaminated objects and soil, the soil and air migration pathways at this site have been eliminated.

This site has been covered by a landfill cap after the radiological material was removed. All soil and air pathways have been eliminated. The nearest water supply well is approximately 1200 feet north of the site.

2.20 INDUSTRIAL WASTE TREATMENT PLANT ABANDONED WASTE TANKS

The abandoned waste processing tanks were located in the southwest corner of the Industrial Wastewater Treatment Plant (IWTP) (See Figure 1). A 1989 Final IRP Report found that soil contamination existed below three of the 11 tank groups. An Interim Remedial Action was initiated in July 1992 for the removal of the tank groups. The proposed soil cleanup levels were obtained in all 11 excavations, with residual contaminants in the soil well below the proposed cleanup levels. The operation involved the removal and disposal of 770 cubic yards of soil and debris as hazardous waste below the Land Disposal Restrictions and the disposal of 440 cubic yards of hazardous soil and debris that required treatment for contaminants above the Land Disposal Restrictions. All soil and debris removed and disposed of were contaminated with low levels (less than 3 ppm) of "F" listed solvents such as 2-butanone, tetrachloroethylene, and total cresols. The tanks and associated contaminated soils were excavated, the excavations tested and backfilled with impermeable clay, and all but two excavations capped with an asphalt road base.

Groundwater contamination exist below the site and is being addressed under CERCLA authority. Contaminants include chlorobenzene, isomers of dichlorobenzene, dichloroethylene, and tetrachloroethylene. Numerous monitoring wells have been installed and are sampled semiannually in order to assess contaminant migration.

The primary source of contaminant migration is through the groundwater. The residual sources of unsaturated soil contaminants have been removed with the tank removal project and natural attenuation will preclude the potential for migration of the residual components to the groundwater. Air migration and contaminant transport by surface runoff are no longer possible due to the method of closeout.

The removal of the abandoned waste processing tanks and associated soil cleanup has removed this SWMU as having any potential impact on human health and the environment.

2.21 INDUSTRIAL WASTEWATER TREATMENT PLANT

The Industrial Wastewater Treatment Plant (IWTP) is located in the northeast portion of TAFB, east of Douglas Boulevard and adjacent to the tributary of Soldier Creek referred to as East Soldier Creek (See Figure 1). The identified SWMUs 24.1 through 24.12 are active units for the processing of dilute concentrations of industrial waste that are received at the site from the various maintenance facilities at TAFB. The Industrial sludge drying beds (SWMU #24.19) have been abandoned and are no longer in use. Due to the complexities of the interactions between influent and process flows, several overflows have been reported since 1985 for lift station #2, tanks D-1 and D-2, the oil separator, and the valve vault. The degree and extent of contamination due to these overflows has not been adequately determined. Air monitoring and soil borings are necessary to determine contaminant pathways and systems integrity.

The available data for the site is limited at present. A contaminated groundwater plume exist under the site which is independent of the B3001 plume located to the west-southwest. The groundwater has been designated an operable unit to the NPL. Numerous groundwater monitoring wells exist within and surrounding the site and groundwater sampling is currently being conducted on a semiannual basis to determine the extent and migration of the plume. The Closure of SWMU #23 indicated soil contamination of VOCs and semi-volatile solvents in soils adjacent to and below the tanks. Investigative data is currently unavailable for the active treatment systems.

The potential migration pathways for the IWTP include air, surface runoff, and infiltration/percolation within the unsaturated soils due to overflows and systems integrity. The air pathways are due to the container processing systems which are open to the atmosphere and of which several utilize aeration for mixing. Volatilization of several organic components within the influent is very probable due to the vapor density of these components within the treatment process systems. These systems include tanks D-1 and D-2, the oil water separator, the equalization basins, mixing basins, solids contact clarifier, and secondary clarifiers. The primary method for surface migration is due to overflows and surface runoff during rainfall events. Groundwater pathways are also important due to the shallow depth to groundwater (less than 15 feet in some instances) and the degree of the disturbed native formations as a result of construction for the systems.

The potential impacts to human health and the environment have not been addressed. The source of the groundwater contamination has not been completely investigated. The source may have been due to past practices, abandoned treatment systems, and/or existing systems. The groundwater contamination at the IWTP has migrated to the regional aquifer from which TAFB and numerous private residences receive their drinking water. The potential risk to public health due to air emissions has not been fully investigated.

2.22 ORDNANCE DISPOSAL AREA

The site formerly used for ordnance disposal is located near the southeast corner of Tinker AFB (See Figure 1). The unit was comprised of a burn pit with an adjacent igloo-shaped bunker. Pit and bunker together occupied less than one-fourth acre of land. Between the early 1960's and 1972 items such as outdated small arms munitions, blasting caps, flares, pyrotechnics,and egress explosives were expended at this site. The frequency of burning was less than once per month. Since 1972 all ordnance disposal required by Tinker AFB has been performed at other locations where suitable facilities and properly trained personnel are available.

The igloo-shaped bunker is still plainly visible, however, there is no visible evidence of a burn pit. The entire area including the bunker is overgrown with vegetation. The site is located on a drainage divide between Crutcho Creek on the north and Elm

Creek on the south, thus, is far removed from any surface water. From monitoring and supply wells drilled in the southeastern part of the base it can be predicted that the most shallow groundwater at the ordnance disposal site is at about 15 to 20 feet in depth. The nearest such well is Water Supply Well #25 located about 1,300 feet east of the site. That well draws water from an aquifer at about 110 feet in depth. Several shallow monitor wells were emplaced in and around Industrial Waste Pit #2 which is about 300 feet west of this site. These wells detected only constituents that might have been expected from that pit. Very little activity takes place in the southeastern corner of the base. About one-half mile south of the ordnance disposal site are bunkers for ordnance storage where people are employed only intermittently.

Due to the site's isolation, age, lack of obvious problems, distance from surface water, and the highly impermeable clay soil no investigations of this site have been conducted.

2.23 SANITARY WASTEWATER TREATMENT PLANT

The sanitary wastewater treatment plant (STP) is located within the northeast corner of TAFB at the industrial wastewater treatment plant (See Figure 1). The STP was constructed in 1943 and is responsible for the treatment of all domestic/sanitary sewage from the east portion of TAFB. The influent of the treatment system begins at the parshalls flume and the bar screen, to the flocculation chamber, the primary clarifier is used for solids separation, the two trickling filters for biodegradation, and the final clarifiers for solids separation, and multi media pressure filters for final effluent polishing. The chlorine contact chamber has been abandoned for chlorine disinfection but effluent still passes through the chamber. The sanitary drying beds are still used for dewatering the anaerobic digester sludge.

Very little site characterization has been performed at the STP. Due to its location within the confines of the IWTP and the fact that the STP is not used for industrial wastewater treatment, primary investigations have focused on the IWTP as a potential contributing source to the groundwater contamination below the area. No definitive contaminants have been identified in the soil or groundwater which may be attributed to the STP.

The potential migration pathways for the processing systems at the STP are systems integrity and overflow due to excessive rainfall events. The integrity of the underground facilities, flocculation chamber, primary and secondary clarifiers, and trickling filters, have not been confirmed or investigated. The design of the trickling filters require the presence of an underdrain system of clay tile over a concrete collector basin for the collection and discharge to the final clarifier. To date, no investigations have concentrated on the subsurface integrity of the systems. The other primary method of migration is the overflow of the primary and secondary clarifiers due to excessive rainfall events. If an overflow has occurred, it has not been documented. An overflow of this type may increase TOC levels within the superficial soil zone and may contribute BOD and COD loading to Soldier Creek. Air emissions are similar to those encountered at any municipal domestic sewage treatment facility and may include very dilute levels of carbon dioxide, carbon monoxide, hydrogen sulfide, and methane. These air emissions, however, have not been determined to be a significant source of atmospheric contamination at the STP.

The potential impacts on the environment and human health associated with the STP are minimal based on existing and historical data which specifically concerns this type of sanitary treatment unit. Potential BOD and COD loading to Soldier Creek as a result of overflows is the only perceived impact for this site at this time.

2.24 BUILDING 976, AFFF FIRE CONTROL HOLDING POND

This unit is located 30 feet from the south edge of Building 976 in the 552nd ACW Alert Facility (See Figure 1). The pond measures 40 by 50 feet and was constructed with sloping concrete sides and a bottom that was originally lined only with clay. It is not known if the roots of vegetation that grew in the bottom penetrated the clay liner. The pond was constructed in 1988 to temporarily contain fire suppression foam (AFFF) released within Building 976. Wash rack drains located in the hangar can transport the biodegradable foam to the pond. There it would be stored until it has degraded to the point where it can be released to drainage culverts that flow to Crutcho Creek.

Before the pond was ever used to contain AFFF, however, an overflow of wash rack water from Building 976 spilled over the sides of the pond and into Crutcho Creek. The spilled water, which contained grease, oil, and mildly alkaline soaps, was quickly contained by constructing a dam in the creek. The contaminated water was then pumped out for disposal by a contractor. Partly because of that incident in January 1992 a flexible membrane liner was installed in the pond to minimize the possibility of organic contamination in the soil under the pond. Since that time the pond has been used to hold AFFF foam that was generated at other places on Tinker AFB. There have been no incidents of release from the pond after installation of the flexible membrane liner.

Potential migration pathways include the water of Crutcho Creek, sediments on the creek bottom, and groundwater which is shallow in this area near the creek. Prior to placing the flexible membrane liner soil samples were analyzed from the pond bottom and the spill area. No contamination was found. The 552nd ACW Alert Facility is a working area for several dozen airmen, some of whom remain on a 24-hour basis in case their services as crew members of E-3 aircraft are needed on an emergency basis. No water supply wells are in operation near this site.

2.25 <u>STAINED DRAINAGE DITCH AND DRUMS (NEAR BUILDING 17)</u>

Building 17 is located in the north central section of Tinker AFB, approximately 300 feet south of the base boundary and Interstate 40 (See Figure 1). Building 17 was constructed in the 1950's as a paint shop. Throughout the years various chemicals associated with painting activities (e.g., paints and solvents) were stored outside in a fenced, paved area adjacent to Building 17. The paved area drains to a storm water culvert located on the southwest corner of the site. The exact quantities of hazardous materials that might have been kept at this site in the past is not known. During remediation of this site in August 1992 no contamination was found during the extensive survey. No additional information is needed in this area since no contamination was found.

There are no monitoring wells in the general vicinity of Building 17, therefore no monitoring data exists. There was no contamination found in this area when the site was remediated. A total of twenty, evenly spaced bore holes, were drilled to a depth of 7.5 feet below ground surface (BGS) within the storage area. Samples for detailed analysis were then collected from three different zones; 1) the concrete pavement; 2) the soil in the bore holes; 3) the one-foot of soil immediately below the concrete pavement. The pulverized concrete from the twenty bore holes was removed and formed into two composite samples submitted for detailed analysis. No contaminants were detected.

Next, one hundred soil samples were taken in one-foot intervals from the twenty bore holes. No contaminants were found in any of the soil samples.

The concrete was then removed and the underlying upper one-foot of soil was excavated and fifteen composite samples were obtained to identify any contaminants that had possibly leached through the concrete pad. No visible signs of contamination were noted during the excavation. The sampling results confirmed that no contamination was present.

During remediation of this site no groundwater was encountered at the deepest depth of excavation -- 7.5 feet. Generally in this area, the perched water table is located at a depth of 20 feet and the top of regional is 50 - 100 feet below ground surface.

There is no threat to human health or the environment from the area southwest of Building 17 used previously to store chemicals associated with painting activities. Field activities and detailed analysis have confirmed that the site is not contaminated.

2.26 FUEL FARM (POL FACILITY)

The Fuel Farm is located at Building 290 and is sometimes called the 290 Fuel Farm (See Figure 1). The original Fuel Farm consisted of five 18,000 gallon Underground Storage Tanks (USTs) and twenty 25,000 gallon USTs. These tanks were used to store motor fuel, aviation gasoline and JP-4. Two major spills of 6,000 and 10,000 gallons occurred in 1979 and 1980. In 1988, the USTs were replaced with above ground storage tanks. The replacement tanks were seven 1000-barrel and two 5000-barrel tanks, having reinforced concrete mat foundations and a protective well surrounding each tank. Additional investigation needs to be preformed to determine the amount of fuel remaining in the groundwater and the full extent of groundwater contamination.

Thirty-two monitoring wells were installed for doing the initial investigations at this site. Of those thirty-two, eighteen were removed during the abandonment of the USTs. The USTs were cut in half and abandoned in place. The existing fourteen wells are being sampled on an annual basis. In the Perched Aquifer the maximum levels of contamination were found to be 8400 ppb Benzene, 890 ppb Toluene and 2060 ppb Xylene. In the Regional Aquifer a concentration of 582 ppb Benzene was found in December 1986.

The migration pathway for this site is limited to groundwater. The Perched Aquifer is about nine to ten feet below the surface. The slope of this aquifer in this region has been measured to be 0.0185 foot/foot. The permeability is on the order of 5.0×10^{-4}. Groundwater should flow at a rate of about 28 feet/year. The uppermost 5 to 10 feet of Earth consists of clay. This is followed by sandstone with several shale lenses. At 35-40 feet below surface a shale continuous shale layer exists.

The Fuel Farm is mostly paved or cemented. There are areas of gravel covering the ground. The nearest water supply over 4000 feet away. The area has limited traffic for fueling of tanks. The maintenance of the farm is contracted for and people are in the area continuously.

2.27 SPILL POND (DRAINAGE SPILLWAY BEHIND BUILDING 1030)

The Spill Pond was located on Crutcho Creek east of Rapcon Road near Building 1030 (See Figure 1). It was used as an overflow for aqueous fire fighting foam (AFFF). The type of waste was AFFF only, the quantities are unknown.

The Spill Pond area was sampled once in July 1991 for sediment and surface water contamination during the Crutcho, Kuhlman, and Elm Creek Remedial Investigation. Sediment sampling revealed the following inorganics, all below background concentrations: copper at 8.1mg/kg, vanadium at 20.4mg/kg, zinc at 31.3mg/kg. Surface water sampling revealed lead at 2.6 μg/l, slightly above the background concentration of 1.8 μg/l.

The primary contaminant migration mechanism acting at the spill pond is the entry of contaminants into the creek followed by downstream transport. Contaminants may enter the creek in the following ways: storm water runoff that erodes contaminated surface media, which reaches the creek via overland flow and/or storm water drainage facilities; leaching of naturally occurring inorganics from soil and sediment; and discharge of groundwater emanating from contaminated areas. Organic contaminants that enter the creek in solution (e.g. voc's in groundwater) will be readily transported downstream. Soluble chemicals present in effluent or groundwater which discharge to surface waters are generally more volatile and, therefore, the concentrations will eventually diminish downstream. Inorganics leached from soil by groundwater or from sediment by surface water will be transported downstream. The inorganics may also sorb or bond to sediment particles and be moved downstream in the sediment matrix. Naturally occurring inorganics, such as barium, will tend to stay in the surface water since the sediment and surrounding soils contain significant levels of barium that can be leached. Contaminants that enter the creek in runoff (e.g., less soluble chemicals, such as polynuclear aromatic hydrocarbons (PAH) or phthalate esters) are more likely to be retained by organic carbon in the sediment matrix and be transported downstream via bulk movement of soil material. The larger the sediment particle, the higher flow velocity required to move the particle. Materials with smaller grain size (e.g., clays) also have more exchange sites and are generally higher in organic carbon. Therefore, it is expected that fine-grained materials containing PAHs, phthalate esters, PCBs, and inorganics may migrate some distance downstream.

The risk assessment performed during the Crutcho, Kuhlman, and Elm Creek Remedial Investigation concluded that the level of contamination found in the creeks' sediment and surface water posed no unacceptable risk to human health. The objective of this assessment was to determine whether the sediments and/or surface waters in Crutcho and Kuhlman Creeks or the tributaries of Elm Creek at Tinker Air Force Base present any unacceptable public health or environmental risks. The results of the risk assessment for surface water and sediment scenarios did not indicate any unacceptable carcinogenic or noncarcinogenic risks associated with the designated beneficial uses of Crutcho and Kuhlman Creeks or tributaries of Elm Creek. A majority of volatile organics tested for in the Remedial Investigation were not detected while the inorganic compounds that were found in all three creeks were also present above detectable limits in the background samples taken upstream and off base.

2.28 CRUTCHO, KUHLMAN AND ELM CREEKS

Crutcho Creek originates south of Tinker Air Force Base and flows northward through the base, toward the North Canadian River. Kuhlman Creek, a tributary of Crutcho Creek, originates in the northern portion of the base. The tributary of Elm Creek originates in the southern portion of the base and flows south toward the South Canadian River (See Figure 1). The specific quantities of hazardous waste within the sediment and surface water is unknown, although the remedial investigation indicated the occasional instances of contamination were at low concentrations. The types of contaminants found included: Sediment- arsenic, barium, chromium, copper, lead, vanadium, zinc, Aroclor 1260; Surface Water- arsenic, barium, calcium, cobalt, lead, magnesium, mercury, sodium, and zinc.

The sediment samples collected in July 1991 and February 1992 at Crutcho Creek did not contain significant quantities of organic compounds. Two of 18 samples collected from Crutcho Creek contained detectable concentrations of semi-volatile organics. Inorganics were detected at low levels in all sediment samples in Crutcho Creek and included arsenic, barium, chromium, copper, lead, vanadium, and zinc. These inorganics were also detected in the two background samples collected from Crutcho Creek upstream and off of Tinker Air Force Base. The surface water in Crutcho Creek did not contain significant quantities of organic compounds. The inorganics detected in the surface water included: arsenic, barium, calcium, cobalt, lead, magnesium, mercury, sodium, and zinc. The sediment samples collected from Kuhlman Creek in July 1991 and February 1992 did not contain significant quantities of organic compounds. One sediment sample contained a polychlorinated biphenyl, Aroclor-1260, at detectable concentrations in July 1991 and February 1992. Only one sediment sample contained detectable levels of semi-volatile organics, primarily low level polynuclear aromatic hydrocarbons. Inorganics were detected at low levels in all sediment samples from Kuhlman Creek: arsenic, barium, chromium, copper, lead, vanadium, and zinc. The surface water in Kuhlman Creek did not contain significant quantities of organic compounds. The inorganics detected in the surface water in Kuhlman Creek included: arsenic, barium, calcium, cobalt, lead, magnesium, mercury, sodium, and zinc.

The primary contaminant migration mechanism acting at Crutcho, Kuhlman, and Elm Creeks is the entry of contaminants into the creeks followed by downstream transport. Contaminants may enter the creeks in the following ways: storm water runoff that erodes contaminated surface media, which reaches the creek via overland flow and/or storm water drainage facilities; leaching of naturally occurring inorganics from soil and sediment; and discharge of groundwater emanating from contaminated areas. Organic contaminants that enter the creek in solution (e.g. voc's in groundwater) will be readily transported downstream. Soluble chemicals present in effluent or groundwater which discharge to surface waters are generally more volatile and, therefore, the concentrations will eventually diminish downstream. Inorganics leached from soil by groundwater or from sediment by surface water will be transported downstream. The inorganics may also sorb or bond to sediment particles and be moved downstream in the sediment matrix. Naturally occurring inorganics, such as barium, will tend to stay in the surface water since the sediment and surrounding soils contain significant levels of barium that can be leached. Contaminants that enter the creek in runoff (e.g., less soluble chemicals, such as polynuclear aromatic hydrocarbons (PAH) or phthalate esters) are more likely to be retained by organic carbon in the sediment matrix and be transported downstream via bulk movement of soil material. The larger the sediment particle, the higher flow velocity required to move the particle. Materials with smaller grain size (e.g., clays) also have more exchange sites and are generally higher in organic carbon. Therefore, it is expected that fine-grained materials containing PAHs, phthalate esters, PCBs, and inorganics may migrate some distance downstream.

The information generated from the baseline and confirmation data collection activities was used to perform a risk assessment based on current U.S. Environmental Protection Agency guidelines. The objective of this assessment was to determine whether the sediments and/or surface waters in Crutcho and Kuhlman Creeks or the tributaries of Elm Creek at Tinker Air Force Base present any unacceptable public health or environmental risks. The results of the risk assessment for surface water and sediment scenarios did not indicate any unacceptable carcinogenic or noncarcinogenic risks associated with the designated beneficial uses of Crutcho and Kuhlman Creeks or tributaries of Elm Creek. A majority of volatile organics tested for in the Remedial Investigation were not detected while the inorganic compounds that were found in all three creeks were also present above detectable limits in the background samples taken upstream and off base.

2.29 SOLDIER CREEK

There are two on-base tributaries to Soldier Creek. These are East Soldier Creek, which is on the east side of Building 3001, and West Soldier Creek, which is on the west side of Building 3001 (See Figure 1). Both tributaries join Main Soldier Creek off-base. The exact amount of solid and hazardous wastes that were disposed of in Soldier Creek in the past is unknown.

The Soldier Creek Remedial Investigation (RI) for the sediments and surface water was completed in April 1992. The Soldier Creek sediment and surface water investigations were handled in two sampling phases. Sampling was conducted along Soldier Creek from Tinker to Reno Avenue in Midwest City, which is almost three miles north of the base. Every sampling location showed minimal or no contamination in the sediment or surface water in both Phases of the RI with one exception. This exception was on-base sampling location E03 during Phase I only. The following contaminants (with concentrations in mg/kg) were found in the 0-6 inch sediments at that location: methylene chloride (140), 1,2-dichloroethene(total) (180), chloroform (9.2), trichloroethene (4.1), tetrachloroethene (83), chlorobenzene (78), chromium (430), lead (255), and nickel (325). The Risk Assessment determined that the risks associated with the sediment and surface water of Soldier Creek were within EPA carcinogenic and non-carcinogenic guidelines. The proposed action is to continue with a long-term monitoring program to verify minimal contamination and risk continue to exist at the site.

There is a perched, top of regional and regional aquifer in this area. The perched aquifer pinches out around the on-base area of East Soldier Creek. There is some interaction between the creek and the groundwater but the extent of this interaction is unknown at this time. Soldier Creek has a clay bed through most of the area of concern. This indicates minimal interaction between the surface water and groundwater, but this is being investigated further. The groundwater in the area was investigated during the RI but the data was inconclusive, therefore the groundwater has been separated out as a separate operable unit under Federal Facilities Agreement (FFA). The interaction of the surface water and groundwater will also be investigated as part of this operable unit.

The Risk Assessment has found no risks associated with the sediment and surface water of Soldier Creek beyond the guidelines set forth by the NCP and the EPA. These risks were calculated by estimating the amounts of contaminant exposure by dermal contact and incidental ingestion with the sediment and surface water of the creek.

2.30 NORTH TANK AREA

The North Tank Area (NTA) is located at the north west corner of B3001 in a grass island (See Figure 1). The site originally housed five USTs of which four have been either removed or abandoned in place. The USTs were constructed or installed between 1943 and 1958. The site has a floating fuel oil plume on the perched water tables at the site. The free floating product plume has been found on both of the perched water tables, one at 14 feet BGS and the other at 29 feet BGS. It is estimated that both plumes jointly contain between 3000 and 8000 gallons of #2 heating oil mixed with dilute concentrations of gasoline.

The site has 13 monitoring/recovery wells installed, eight vapor wells were installed for the performance of two vapor extraction-air permeability tests, and 13 soil borings have been used to determine the areal extent of contamination. Primary contamination appears to be located adjacent to the abandoned 235,000 gallon #2 heating oil tank.

The hydrogeology of the site is very complex. The upper perched zone is very shallow in vertical extent (3 to 10 inches) and appears to be discontinuous at the site. The lower perched zone consists of a fine to very fine grained sandstone that is heavily impregnated with silt and clay fractions. The permeability of both zones is very limited (estimated at less than 10^{-5} cm/sec. Both zones appear to be horizontally and vertically confined by shale and siltstone formations. At present time, there are no indications that the plume has migrated more than 50 yards from the site. Soil and air quality analyses have indicated that no capillarity is present at the site and no fuel components or vapors have been detected above 11 feet BGS. Therefore, potential migration by air pathways and surface runoff are not pertinent to this site. The free floating product has been undergoing recovery since May 1991 and groundwater suppression was enacted in May 1992.

At present time and based on the physical characteristics of the site, no potential impacts to the public health or the environment exists.

2.31 SOUTHWEST TANKS AREA

The Southwest Tanks area is located to the southwest of Building 3001. The area has 17 underground storage tanks (USTs) located south and west of Building 3108, west of Building 3117, and north of Building 3105 (See Figure 1). The tanks are alleged to have held a variety of fluids that included lubricating oils, solvents, and fuels. All tanks are currently out-of-service and reported as abandoned. Sixteen of the tanks are listed as steel vessels with capacities of 1,000 gallons to 20,000 gallons. The remaining tank is a site-built concrete vessel of an estimated volume of 4,000 gallons.

The UST's contents were sampled in 1988 and elevated levels of petroleum hydrocarbons and fuel products were found in all tanks. Contaminants and levels included 804,000 parts per million (ppm) of total petroleum hydrocarbons (TPH), 1600 part per billion (ppb) of toluene, and 7300 ppb of xylene. Immiscible layers of water and product were found in over half of the tanks sampled. The USTs are not subject to leak testing and the integrity of the USTs and their related piping is questionable.

The latest round of soil samples were obtained as part of an investigation conducted in 1992. A total of 36 boreholes were drilled as part of this investigation. 91 samples were obtained and analyzed for TPHs, benzene, toluene, ethylbenzene, xylene (BTEX), and volatile organic compounds (VOCs). The most common contaminants found were TPH and BTEX compounds. TPHs were present in approximately 75% of the samples analyzed in concentrations up to 4,320 ppm. Toluene was the next most common analyte found with maximum concentrations of 550 ppm. Toluene was found in 19 samples and it should be noted that most samples that contained toluene were obtained from below the upper water table. Xylene was found in 16 samples with maximum concentrations of 37 ppm and benzene was found in 2 samples with a maximum concentration of 0.137 ppm. Ethylbenzene was found in 13 samples with a maximum concentration of 5.15 ppm and 1,1 dichlorobenzene was found in 6 samples with a maximum concentration of .05 ppm. It is estimated that 11,425 yd^3 of soils contaminated with TPH are present at the one acre site.

Although the site has been the subject of various investigations and studies, the southwestern extent of the soil contamination has yet to be accurately defined.

It appears that significant vadose zone contamination does not exist at the site. The majority of the contamination is encountered at a depth of 10 feet below ground surface (BGS) and extends to below the water table. All elevated levels of contamination were encountered within, or immediately adjacent to, the backfill areas of the USTs. The highest levels of contamination were encountered at a depth of 10-15 feet BGS in the vicinity of a large buried concrete vault known at the monolith. The monolith houses seven, 20,000 gallon USTs and is the focus of several ongoing innovative technology demonstration (ITD) projects.

Tinker Air Force Base sits atop a major aquifer known as the Garber-Wellington Formation. Groundwater exists in the Garber-Wellington Formation under both water table and confined conditions, depending on the presence of overlying shale beds. Recharge of the aquifer occurs from precipitation,infiltration, and streams which occur in its outcrop area. Tinker Air Force Base is included in the recharge area for the Garber-Wellington. There are approximately 20 water supply wells located on Tinker Air Force Base that draw water from this aquifer. The wells provide 4 to 6 million gallons of water per day for use by the Base, making the Base the largest user of groundwater in the area. These wells average about 217 gallons per minute and consist of multiple screens from a depth of about 200 feet BGS to 700 feet BGS. Tests on the aquifer yielded permeabilities in the range of 10^{-3} cm/s.

Interbedded sandstone, siltstone, and shale of the Garber-Wellington formation underlie the SW Tanks area. Cross sections from the site reveal that clay and shale were typically encountered to a depth of 5 to 15 feet BGS. The average permeability of these soils is 1.75×10^{-7} cm/s. This was typically followed by sandstone interbedded with shale and siltstone. Some boreholes have found a transitional, hard, thin bed of varying thickness at 10-12 feet BGS. This hard bed is composed of cemented reddish-brown silty clay changing to a gray siltstone with depth. Below this hard layer is a sandy unit that extends to depths approximately 40 feet BGS. This sandy unit is composed of clay, pebbly zones, siltstones, and silty sand interbedded with fine to coarse-grained reddish brown sand. This unit should be considered a primary subsurface aquifer system. Groundwater at the site flows from the northeast to the southwest.

Groundwater at the site is contaminated with solvents and metals, which are believed to have migrated from contaminated areas under Buildings 3108 and 3001. Additional contaminants include BTEX and TPH compounds. The nearest water supply well is WS-13, located 4/10 of a mile to the northeast of the site and screened at depths starting at 200 feet BGS. The risk of contact with contaminated groundwater in the perched and top of regional zones of the aquifer is considered small due to the upgradient position of the nearest groundwater supply well and to the recent installation of extraction wells as part of the Building 3001 groundwater remediation project. The SW Tanks area is included in the capture zone of these wells, and recovered groundwater will be treated in the newly constructed Groundwater Treatment Plant. The system is expected to be on line and operating in February of 1993.

Land use within a 1/2 mile radius or the site include a military aircraft runway and depot level military aircraft repair and rework facilities. No ecologically sensitive areas, housing, or military quarters are located within a 1/2 mile radius of the site. Direct contact with the contaminated soils is unlikely since the contaminants present are located several feet BGS in low permeability soils. For this reason, airborne contact with high levels of contaminants under present conditions is unlikely. However, this pathway may become important if it is determined that soil must be excavated.

2.32 BUILDING 3001

The Building 3001 site is located in the northeast section of Tinker Air Force Base and encompasses the building complex (See Figure 1) and surrounding areas within the lateral extent of the groundwater contaminant plume. From the 1940's through the 1970's, subsurface pits and trenches within Building 3001 were used to contain industrial solvents and wastewaters. Over that period of time, the pits and trenches leaked and allowed percolation of contaminants into the soil. Subsequent downward migration contaminated the perched, top of regional and regional aquifers. The contaminant plumes extend to a maximum depth of 175 feet and laterally across an area of approximately 220 acres within the groundwater. The primary contaminants are trichloroethylene, chromium, benzene, tetrachloroethene, lead, and nickel.

The maximum concentrations of the primary contaminants are: Perched aquifer- trichloroethylene at 250,000 $\mu g/l$; chromium at 889,000 $\mu g/l$; benzene at 1535 $\mu g/l$; tetrachloroethene at 15000 $\mu g/l$; lead at 140 $\mu g/l$; nickel at 82 $\mu g/l$; Top of Regional Aquifer- trichloroethylene at 46,000 $\mu g/l$; chromium at 24,000 $\mu g/l$; benzene at 650 $\mu g/l$; tetrachloroethene at 740 $\mu g/l$; lead at 16 $\mu g/l$; nickel at 51 $\mu g/l$; Regional Aquifer- trichloroethylene at 1100 $\mu g/l$; chromium at 110 $\mu g/l$; benzene at

430 μg/l; tetrachloroethene at 25 μg/l; lead at 18 μg/l; nickel at 56 μg/l.

The subsurface beneath Building 3001 is divided into 3 waterbearing zones: perched aquifer 15-30′; top of regional aquifer 50-80′; regional aquifer 110-175′. The perched water is slightly mounded at the northern and southern ends of the building with some flow towards the east but overall flow is to the southwest. Vertical migration of groundwater along paths of preferential flow from the perched zone (approximately 6′ per year) has contaminated the top of regional and regional aquifers. The top of regional and regional aquifers are marked by interbedded sandstone, siltstone, and shale creating a greater potential for vertical migration (4-6′ per year) to the lower units of the aquifer. The groundwater flow in the top of regional and regional is to the west and southwest.

The primary pathway in which humans could be exposed to the contamination at Building 3001 is through the groundwater being used as a drinking water source. There were three water supply wells within the Building 3001 area, screened at approximately 200 to 700 feet. In 1984, water wells 18 and 19 were found to contain TCE and PCE and were taken out of operation. In September 1986, they were plugged and abandoned in place. Water well 17, immediately downgradient of the contaminant plume, was plugged and abandoned in place in November 1988. The contaminated soil is not considered a source of contamination as the building separates the soil from the surface and direct human contact. The risk assessment conducted in 1988 indicated a low carcinogenic risk, 1.2×10^{-5}, well within acceptable levels of 10^{-4} to 10^{-6}.

2.33 OLD PESTICIDE STORAGE AREA, BUILDING 1005

The Old Pesticide Storage Area is located at Building 1005 which is near the center of the base on the west side of Air Depot Boulevard (See Figure 1). A sanitary sewage treatment plant, which is no longer active, was also located here. The sludge drying beds of that old treatment plant are now being used as a 90-day site for hazardous waste accumulation. Building 1005 reportedly was used to store and mix pesticides. The dates of this reported operation are not known, but they are not recent. The building is a 30 by 60 foot concrete block structure with a concrete floor.

No investigations have been conducted in the immediate vicinity of Building 1005. Water Supply Well # 6, which draws water from about 250 feet in depth, is located 300 feet north of Building 1005. No pesticides have been reported in any of the samples routinely taken from this well. Crutcho Creek lies approximately 1,500 feet south. No persons are permanently employed at this site, however, several dozen personnel are employed at the 3rd Combat Communications Group located just to the north of this area. Because of the concrete floor and distance from surface water the potential for release to any media is believed to be low.

2.34 FUEL TRUCK MAINTENANCE

Building 2110 is located in the east-central part of Tinker AFB about 980 feet west of Douglas Boulevard (See Figure 1). This building houses the fuel truck maintenance and repair facility. It is a metal building about 40 by 80 feet in size. The floor is concrete that slopes inward to a central trench extending the length of the building. The trench leads to a lift station from where liquids are pumped to an industrial line that leads to the Industrial Wastewater Treatment Plant. The facility is active and has been operational since about 1975.

When a truck is brought into the facility, the contents of its tank are dumped and channelled through the trench to the lift station. The tank, hose, truck body, and engine parts are then washed clean. Rinse water flows over the floor to the trench and drains to the lift station. When the lift station nears capacity, oil and fuel are skimmed from the surface, pumped to a holding tank, and later disposed. Remaining water is pumped to the IWTP.

The concrete floor consists of several separately poured concrete slabs with grout in the gaps between the slabs. Visual examination has indicated that the grout is absent in several places. There are also cracks in the concrete slabs. Releases to soil have occurred as seepage through the cracks and gaps in the floor. During operations in November 1990 to install an oil/water separator water mixed with diesel fuel and JP-4 aircraft fuel began to flow into the ditches being dug for new pipes. The operations were stopped until recovery of the fuel could be completed. About 700 gallons of water were removed which contained an estimated 15 gallons of fuel.

There has obviously been a release of contaminants to the soil beneath the building. Fuel may have migrated downward to groundwater beneath the site. From other studies in the area it is estimated that the shallowest water table is at 15 to 20 feet in depth. No investigations have taken place at the site, although it is an item scheduled for study in the RFI. Water Supply Well # 23 is located about 200 feet southeast of the site, but has not been operational for several years so no information is available. No surface water bodies lie in the vicinity of Building 2110. Perhaps as many as 100 or more people are employed in the this area including Buildings 2110, and 2101, which is the main ground vehicle maintenance facility. The clay soil in this area has been shown to be highly impermeable, however, the time available and the abundant source may have produced a significant plume around the building in both soil and groundwater.

2.35 WASTE FUEL DUMP SITE

The waste fuel dump site (WFDS) is located in the east central part of Tinker AFB about 400 feet southwest of Building 2121 and about 2000 feet west of Douglas Boulevard which forms the east edge of the base (See Figure 1). Just to the north of the site is a large concrete apron and a hanger building where maintenance is performed on military aircraft. Some product storage and maintenance facilities for ground vehicles are located to the east. The area south and west of the site is a clearance zone for the two main runways. This is a rolling grass covered area distinguished only by a small tank farm for waste fuel, and a closed waste pit that is not visually apparent. Several dozen employees work in the maintenance facilities to the north and east. The waste fuel dump site, however, is occupied only occasionally by a few employees when fuel dump operations are taking place. There are no surface streams near this site. An intermittent shallow water table exists at about 15-20 feet while the regional and useable aquifer lies at a depth of 40 feet or deeper. One water supply well(#22) lies 400 feet northeast of the site that produces from below 100 feet.

This facility was in operation from about 1975 to October 1990 and was designed to hold JP-4 and JP-5 fuel that had been drained from the tanks of aircraft brought in for maintenance and repair. The fuel was considered unusable for reinsertion into the airplane tanks so it would ultimately be disposed of or sold for energy recovery. The dumping operation involved transferring fuel from a truck into a rectangular metal bunker about 6 feet by 8 feet and 2 feet in depth. The bunker sat entirely above ground on metal posts about 1 1/2 feet high. An overflow port, designed to allow the dumped fuel to settle, led into a pipe that extended down a moderate slope about 200 feet to two above ground horizontal cylindrical holding tanks. Approximately one-third of the pipe length was buried underground. The metal bunker and the cylindrical tanks sat on bare soil. The bunker, however, was immediately adjacent to an asphalt pad about 60 feet by 80 feet in size. A steel ramp sat on the edge of the asphalt pad adjacent to the metal bunker. Trucks loaded with fuel would be driven onto the ramp and hoses extended to the bunker in order to dump the fuel. This operation was sometimes carelessly performed resulting in spills around the metal bunker and onto the asphalt pad where the spilled fuel would flow off and into adjacent soil.

In October 1990 operations ceased and the equipment dismantled and moved off-site so that construction to upgrade the facility could begin. Plans were made to remove the asphalt pad and some obviously contaminated soil, pour a concrete ramp for the trucks, and install proper spill containment for the tanks and bunker. Then the equipment would be reset in place.

In an effort to determine the extent of contamination a total of eleven(11) boreholes were drilled to a depth of ten(10) feet. Soil samples from just below the surface and at two feet intervals were collected from each borehole for analysis. Although no soil description logs were prepared for these boreholes the drill cuttings strongly resembled the description of the same stratigraphic section in Monitor Well 4A of Industrial Waste Pit #1, a closed site just 500 feet to the southwest. The section is characterized by alternating layers of clay, shale, and sandstone. The clay and shales are brown to red in color, very fine grained, and well indurated. The sandstones are white to orange in color and vary considerably in degree of consolidation. Monitor Well 4A exhibited some moisture at 20 feet and a standing water level at 39 feet. No water was encountered in the subject 11 boreholes.

The eleven borehole samples were analyzed for BTEX, total petroleum hydrocarbons(TPH), and for the metal lead using both total and TCLP methods. Some organic contamination was found at all levels while lead was found only in concentrations that might be expected in any background soil sample. Five additional locations were chosen and sampled at depths of about six inches and four feet. TCLP benzene and TPH analyses were performed on these samples. The TCLP analyses proved negative for benzene, however, the TPH tests resulted in higher concentrations than those from the first 11 boreholes, in some cases exceeding 9,000 ppm.

Using information from all 16 boreholes the extent of contamination was determined by constructing contours of TPH concentrations at levels of 6-8 inches, 4-6 feet, and at 8-10 feet. Near surface contamination, based upon the 50 ppm contour extends over an approximate one-fourth acre area. The area within the 50 ppm contour decreases with depth, but even at 10 feet the central TPH concentration exceeded 300 ppm.

A decision was made to remove 350 cubic yards of soil from the central part of the contaminated site where TPH concentrations exceeded 9,000 ppm. That amount of soil was excavated from a pit 22 feet by 36 feet by 12 feet in depth during the month of June 1991. The soil was aerated until TPH concentrations fell below 1000 ppm and then disposed of in a landfill approved by the Oklahoma State Health Department. This entire operation was also coordinated through the Oklahoma Water Resources Board and the Oklahoma City-County Health Department. The pit was backfilled with clean soil, but before doing so, soil samples were taken from the bottom of the pit. Analysis of these samples resulted in an average of 400 ppm TPH at a depth of 12 feet. Thus, contamination does remain at the site both in depth and horizontally.

From June to September 1992 investigations with a cone penetrometer were conducted at the Waste Fuel Dump Site. Penetrations to depths of 20-25 feet were performed on a 50 foot grid over a much larger area than the previous borehole program. Data from this investigation are still being analyzed. A report on this survey is scheduled for publication in December 1992.

Water Supply Well WS-22 is located about 400 feet east of the waste fuel dump site. No EPA method 601 contaminants were detected in water samples from that well in a 1984 Radian Corporation study. The well was last sampled in January 1990. All organics were below drinking water standards at that time.

2.36 BUILDING 3001 HCL TANK

The HCL Tank is located in Building 3001 at column G-54. It was an 8-foot diameter, 14-foot high steel shell, rubber lined vessel which stored HCL used in process operations. The 4000 gallon tank was positioned in a concrete containment area with associated piping and pumps.

On December 12, 1990, a release was observed. A hole in the tank allowed acid to leak onto the concrete resulting in another hole being eroded through it to the soil beneath. The acid then migrated laterally into a tunnel containing electrical conduits. Approximately 540 gallons of acid flowed into the tunnel. An unknown amount soaked into the soil beneath the containment area. The visible area of contamination was neutralized and eight barrels of soil were excavated and shipped off-site for disposal.

Soil contamination has obviously occurred. From investigations related to the Superfund site beneath Building 3001 it is known that groundwater lies about 15 feet beneath the surface. Groundwater has not been tested beneath the HCL Tank. Further migration might have occurred laterally through cracks in the sides of the tunnel.

Building 3001 is an area of intense activity with many people employed and passing through. Though no drinking water comes from the immediate vicinity of the building the potential for other exposure to contaminants is high.

2.37 TANKS 231A AND 248

Deicing fluid tanks 231A & 248 are Underground Storage Tanks (USTs) which are located northeast of hangar Building 230 and west of the Building 244 (See Figure 1). These USTs were removed from service with notice provided to the EPA and the State of Oklahoma Corporation Commission. UST-231A was a 12,000 gallon steel tank installed in 1942, and revised as constructed in 1944 and 1966. Prior history indicates that this tank had been originally utilized as an aircraft defueling tank but its usage was changed to deicing fluid storage in the mid-seventies. UST-248 was installed in 1983 with records indicating dedicated use as a deicing fluid storage tank. These tanks have had good integrity with no indication of leaks in the past and no anticipation of finding contamination upon their removal.

Regulatory threshold quantities of hazardous waste contaminants were not encountered. Deicing fluid, propylene and ethylene glycols, are not identified as regulated hazardous wastes nor as regulated petroleum products. Pursuant to Oklahoma Corporation

Commission (OCC) regulations, a soil sample is required to be taken adjacent to and below each UST being permanently closed. Soil samples were taken for each tank and analyzed for BTEX, Total Pb and TPH, with concentrations reported within the regulatory parameters. No areas were identified where information was found to be necessary.

The migration pathway for this site is limited to localized contamination of the adjacent backfill soils to the UST and any existing groundwater. While no groundwater was encountered at this site during excavation of these tanks, a Perched Aquifer has been identified approximately 800 feet to the west-northwest at about nine feet below the surface in the area of Building 214. The slope of the aquifer at Building 214 has been measured to be 0.0185 foot/foot with the permeability is on the order of 5.0×10^{-4}. Groundwater should flow at a rate of about 28 feet/year. The first ten feet of earth at Building 214 consists of clay. From here it switches to sandstone for another ten feet. Below the sandstone there exists shale, which forms the Perched Aquifer. All excavation soils encountered having BTEX components identified by analysis were disposed of at an offsite, licensed landfill and the excavation backfilled with clean soils of similar clay content.

As the tanks were not previously identified as having leaked in the past or removed from service due to loss of good integrity, and as the low levels of BTEX components are indicated by testing to be highly weathered and most likely from small overfills in the distant past, and as all low-level contaminated soils were removed for disposal, and as the location is military industrial activity with moderate aircraft operations and limited access, little to no potential for adverse impact upon human health and the environment exists for this UST site.

2.38 AREA A FUEL STATION

Area A Fuel Station was a motor fuel station located south of Building 414 (See Figure 1). The site consisted of four Underground Storage Tanks (USTs). Tanks 438 and 439 were installed in 1942 and taken out of service in 1978. Each of these two tanks held 12,000 gallons and were used of leaded and unleaded mogas. Tank 411 was used for unleaded gasoline and was taken out of service when the station closed in 1990. Tank 411 was a 10,000 gallon tank. Tank 402 was installed in 1975 and was used for diesel. Tank 402 was also taken out of service when the station closed in 1990. The only known waste at this location is mogas. Floating product exists and a recovery system is extracting that product. Additional investigation is required to more fully delineate the groundwater contamination.

Three Perched Aquifer monitoring points have been installed in this area. The full extent of groundwater contamination has not been delineated. The groundwater maximum groundwater contaminants are benzene at 16,700 μg/L, toluene at 27,200 μg/L, ethylbenzene at 135 μg/L and total xylenes at 17,700 μg/L. A total of eight soil borings were preformed. Each boring went from 19 to 25 feet in depth and analysis was done once every three feet per boring. The area of contamination covers approximately 13,500 sq. ft. of soil. Contamination starts at less than three feet below the surface and extends to over 25 feet in depth. The maximum soil contaminants are benzene at 26,400 μg/Kg, toluene at 140,000 μg/Kg, ethylbenzene at 63,000 μg/Kg, total xylenes at 247,000 μg/Kg and total petroleum hydrocarbons (TPH) at 17.4 mg/Kg.

The migration pathway for this site is limited to groundwater. The Perched Aquifer is about twelve to fifteen feet below the surface at this site. The gradient of the water table in this area has been measured to be 0.0086 foot/foot. The first seven to ten feet of earth at this location consists of clay. Below this there are several layers of sand and silt.

No surface water is in the area. The area is covered with gravel and paved roads. The area containing gravel has been fenced in. The nearest water supply well is over 2,900 feet away. No one works in the area.

2.39 TANK 740

Waste oil UST 740 was a 500 gallon steel tank located in the northwest alcove of Building 740 AAFES BX Service Station. The station is located in the north central quadrant of Tinker AFB (See Figure 1). This tank served as a receptacle for used motor oil from personally owned vehicles serviced by BX service station personnel until picked up for recycling. A leak was suspected in November 1991, at which time the tank was removed from service and notice provided to EPA Region VI and the State of Oklahoma Commission Corporation on both the suspected leak and the removal from service.

The quantity of waste oil released is unknown and unconfirmed due to unusual site conditions encountered during a scheduled tank excavation. The concrete cover was broken up and removed to reveal that the top of the UST was overlaid by twelve electric cables in metal conduit and one air line. Borings were taken adjacent to the UST in satisfaction of the OCC-UST rules and regulations did not indicate the presence of waste oil constituents. Other contaminants found at this site unrelated to the 740 waste oil UST were unleaded gasoline constituents identified in the drill cuttings from a nearby fuel storage tank release in the past. An Initial Abatement Report was sent to the EPA and the OCC notifying them of the potential release of gasoline products from the service station fuel storage tanks. No additional information is warranted in this area for waste oil contaminants.

All activities within one-half mile of this location are either light industrial activity, military offices, or airfield operations and support facilities. While fuel vapors were found to be emanating from the borings at a depth of 10 to 13 feet, no waste oil contaminants were identified. Confining layers of shale were found underlying this zone. The nearest down-gradient water well is located approximately one-third mile away at a depth of 900 feet. There are shallow perched aquifers scattered over this area of the base which are low yielding, of poor quality, and are not used as potable, "drinkable or fishable waters", or for irrigation. A storm sewer was located up-gradient of the waste oil tank and found not to be of regulatory concern as a conduit for contaminants. TCLP metals analysis was performed on the regulatory required soil sample. All metals analyses were within established soil action levels, except Barium, indicating no further action is required. The Barium concentration, while elevated, is more indicative of local soil conditions than from contamination.

Underground Storage Tank (UST) which is located on the southwest side of Building 214 (See Figure 1). This UST is no longer in use. The dates for service for this tank are unknown. The exact size is unknown. The use of this tank is also unknown, but is thought to have been a waste fuels tank. Addition information is required to determine the extent of groundwater contamination.

2.40 TANKS 3100, 3104 AND 3106

USTs 3100, 3104, and 3106 comprised a three tank battery supporting a Tinker AFB (TAFB) mission essential fuel testing facility. They were located in the northwest quadrant of TAFB, west of the Buildings 3001 and 3108 complex in a controlled access area adjacent to an active runway prior to excavation and removal (See Figure 1).

USTs 3100 and 3104 were 15,000 gallon capacity tanks used to store new naphthalene calibration fluid product, and UST 3106 was a 30,000 gallon tank used for accepting Building 3108 chilled water condensate and spent calibration fluid discharged through a gravity flow effluent pipe leading to the tank. Only petroleum product contaminants were identified in the soils as

determined through regulatory required sampling below each of the USTs. Soils were not tested for metals pursuant to current EPA and Oklahoma Corporation Commission rules and regulations governing petroleum USTs and because tank records indicated that these tanks were used solely for the storage of new calibration fluid and the collection of chilled water and used calibration fluid for recycling. Four monitoring wells were installed, and the cuttings from each of the borings composite sampled for BTEX, TPH, and Total Pb in zones most likely to contain contamination and as identified qualitatively on-site by HNU and/or an OVA.
Additional information is not necessary as the sources of contamination and associated wastes were excavated and disposed.

Migration pathways for this site are limited to groundwater and localized contamination of the backfill soils adjacent to the UST in the excavation. The depth of the excavation was a maximum depth of 17 feet without encountering any groundwater where the excavation was open for several days during the tank removals. Contaminated soils encountered were segregated for sampling, analysis, and disposal. Excavation of adjacent contaminated soils was continued until soils below regulatory levels were identified. The three nearest water supply wells have all been plugged and abandoned. There are three active base water supply wells each approximately one-third mile from the 3100 site and each up-gradient. Both abandoned and active, storm water and sanitary and industrial waste lines run north-south through the area. No leakage from this tank battery was found to contaminate the sewers in this area. A number of TAFB utility lines were encountered from one to three feet in depth running north-south of the USTs. Due to the up-gradient location of the lines, their shallow depth compared to the six foot depth of the tank tops, they can reasonably be excluded as conduits of a release from the 3100 USTs site.

Activities and land use within one-half mile of this UST site are primarily heavy industrial repair of various military aircraft or active airfield operations and airfield support activities. Due to the limited and controlled access to this area, the nature and use of the surrounding and adjacent areas, and since the source of contamination along with identified contaminated soils have been removed, this UST site no longer appears to be a source of petroleum contaminants with a potential impact upon human health and the environment. No further action is warranted at this site.

2.41 <u>3700 Fuel Yard</u>

The 3700 Fuel Yard is located east of Building 3703 (See Figure 1). The site originally consisted of six underground storage

tanks (USTs). Each tank has a capacity of 25,000 gallons and held JP-4 fuel. All six tanks were installed in 1954 and removed in 1991. The site currently consists of above ground storage tanks. The only known waste at this location is JP-4 which leaked out of two of the six tanks. No floating product exists. Additional information is required to delineate a soil plume found at a depth of 30 to 35 feet deep.
Three Perched Aquifer monitoring points exist surrounding the former location of the USTs. The groundwater plume covers an estimated area of 9600 sq. ft. The maximum groundwater contaminants are benzene at 120 $\mu g/L$, toluene at 0.84 $\mu g/L$, ethylbenzene at 11 $\mu g/L$ and total xylenes at 0.56 $\mu g/L$. A total of seven soil borings were preformed. Each boring went to 35 feet in depth and analysis was done once every five feet per boring. Two separate plumes were found. The first, which ranged from 5 to 10 feet had a maximum concentration of total petroleum hydrocarbons (TPH) of 1070 mg/kg. This plume has been estimated to cover an area of 9600 sq. ft. The plume at 30-35 feet had a maximum TPH concentration of 282 mg/kg.

The migration pathway for this site is limited to groundwater. The Perched Aquifer is about eighteen to twenty feet below the surface at this site. The gradient of the water table in this area has been measured to be 0.013 foot/foot. The first ten feet of earth at this location consists of clay with some lenses of sand and siltstone. Below this there are several layers of fine grained sand with occasional lenses of siltstone to 25 feet. Below this, shale exists and this forms the Perched Aquifer.

No surface water is in the area. The area is covered with gravel. The nearest water supply well is over 900 feet away and is upgradient to the site. The area has limited traffic for fueling of tanks. The maintenance of the Fuel Yard is contracted, and people are in the area continuously.

2.42 TANK 6002

Waste oil UST 6002 was a 500 gallon steel tank installed in 1982. UST 6002 is located in the north-northwest quadrant of Tinker AFB (See Figure 1). The tank was utilized for the collection of used automotive oils from personally owned vehicles being serviced by authorized military, retirees, and dependent patrons of the hobby shop. This tank was taken out of service under an Air Force policy to eliminate USTs wherever possible by their removal from the ground for proper disposal. The EPA and the Oklahoma Corporation Commission were provided notice prior to both its removal from service and permanent closure by removal. This tank indicated good integrity with no leaks in the past and with no anticipation of finding contamination upon its removal.

Surficial soils indicated no contamination, but soils on the west wall of the excavation were stained with highly weathered, high viscosity waste oils in an area immediately below a gravity flow feed pipe connected to the waste oil tank. Compression of soils overlying the PVC feed pipe due to auto traffic across a parking lot accessway to the shop appears to have been the cause of the cracked, leaking pipe. Shales and clays underlying the tank confined the contamination to an area within the backfill of the tank and an area immediately below the PVC feed pipe. As the required regulatory samples below the tank and the piping after removal of contaminants analyzed within regulatory limits, no additional information is necessary.

Potential migration pathways were limited to groundwater and localized soil contamination. No groundwater was encountered to a depth of approximately twelve feet during excavation of the tank. The area has no surface waters nor are there any storm sewers within 125 feet of the excavation at or below the identified depth of the contaminants.

The potential impact on human health and the environment from the potential migration pathways via groundwater and soils is extremely low to non-existent post-closure. The nearest base housing is approximately 1200 feet, and the nearest active water well is approximately 3/4 miles to the east. Land use within one-half mile of the UST is primarily personnel support and recreational activities. As all contamination soils were excavated and disposed of with the leaking piping and the UST, the source of the contamination was eliminated. No further action is warranted at this site.

2.1 LANDFILL 6

Tinker Air Force Base (TAFB) is located in central Oklahoma, in the southeast corner of metropolitan Oklahoma City, in Oklahoma County. The Base is bound by Sooner Road to the west, Douglas Boulevard to the east, I-40 to the north, and Southeast 74th Street to the south. Landfill 6 (LF6) is not located on TAFB property. It is near the southeast corner of the Base just south of Southeast 59th Street and approximately 1/2 mile east of Douglas Boulevard on land leased from Oklahoma City (See Figure 1).

The LF 6 site occupies approximately 40 acres, with only 25 acres actually covered by the landfill itself. The landfill was used to dispose of general refuse, industrial waste, such as paint buckets and insecticide cans, and industrial wastewater treatment plant sludges until its closing in 1979. For several years, highly permeable river sand, clay, and sand/rock were used to cover the waste material each day. After closure in 1979, the trenches were covered with several feet of compacted soil and vegetated with grasses. The landfill was covered by a compacted clay cap in 1986 as part of an interim action at the site.

A Remedial Investigation (RI) was conducted in 1990. During the